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THE SYSTEM OF THE WOMB,

WITH

A particular Account of the MENSES, independent of a PLETHORA:

To which are ſubjoin'd,

A few OBSERVATIONS relating to *Cold*, and its Effects upon the *Body*.

By THOMAS SIMSON *Chandos-Profeſſor of Medicine and Anatomy in the Univerſity of St.* Andrews.

Veſtigia filo regenda ſunt: Omniſque via uſque a primis ipſis ſenſuum perceptionibus certa ratione munienda.
BACON. præf. ad organ. nov. ſcient.

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MDCCXXIX.

TO THE

Duke of *Chandos*.

MY LORD,

THE Honour you have done to Learning, in eſtabliſhing a new Profeſſion in this Univerſity, is an abundant Proof that

Your *Grace* has a different Thought from theſe who officiouſly wou'd perſuade the World, too lazy of itſelf, that all Propoſals for improving the Liberal Arts are idle and preſumptuous, theſe having long ſince got their finiſhing from Maſters that are not now to be equal'd.

Medicine, 'tis true, has been more than Two thouſand Years under the Tutory of Profeſſors, and ſome of theſe Men of an extraordinary *Genius*; but how ſhort a Time is it ſince the Circulation of the Blood was found out, before which it was impoſſible there could be any tolerable Reaſoning on the *Phœnomena* of the Body? So that in this Reſpect our *Theory* is yet in a State of Infancy.

The Invention brought immortal Glory to our Nation, and promiſes the greateſt Advantages to Mankind; but Nothing beſides the Continuation of *Harvey*'s Induſtry and Method can make them good.

He demonſtrated the general Circulation, by deſcribing the Syſtem of the Heart, and whoever pretends to ſhew how it is varied in particular Parts of the Body, and to trace its Irregularities there, muſt deſcribe theſe Parts, as he did the Heart with its Appurtenances.

How far I have followed the laudible Example, in making out the Syſtem of the Womb, is what the Men of our Profeſſion muſt judge of; in the mean Time, my own Thoughts of the Performance are ſuch as determine me to put it into your *Grace*'s Hands, to ſerve, at leaſt, as a Proof of my Induſtry in anſwering the Deſign of the *Chandos-Profeſſion.*

You have been, my Lord, the living Executor of your own Bounty, (to uſe the Spectator's Phraſe in the delicate Character of *Manilius*, which, in my Judgment, no Pen cou'd have drawn but in Your *Grace*'s Lifetime) and what can be more wiſh'd for, by one who daily ſhares in it, than that the benevolent Projector, ſo ſtudious of the Intereſt of Mankind, ſhou'd have the Satisfaction to ſee of its

Fruits? All Senſe of Gratitude and Honour muſt be loſt, when ſuch Ambition ceaſeth. I am,

MY LORD,

Your Grace's

moſt obedient,

moſt devoted

humble Servant,

THOMAS SIMSON.

THE INTRODUCTION.

THE immortal *Harvey*, from a few ſimple *Experiments*; and the Conſideration of a few obvious Things in the Structure of the *Heart*, and the Veſſels that immediately are attacht to it, demonſtrated the Circulation of the Blood, with ſuch Evidence, that it now forceth the Aſſent of every one, who gives himſelf the Trouble to read it, tho' the moſt diſtinguiſhed *Anatomiſts*, cotemporary with the *Author*, had a thouſand Things to ſay againſt it, and were brought to ackowledge it with the greateſt Struggle; but the Debate was not long; in leſs than Half a Century their Prejudices wore off, ſo that there was ſcarce one found to oppoſe the *Harvean* Doctrine; the *Author*'s Praiſes were every where celebrated in higheſt Strains, and *Phyſicians* took new Courage in their Inveſtigations, when, by one Man, they found the Hiſtory of the *Heart* at once undertaken, and finiſhed, and that upon Principles, which at any Time might have been known. This Succeſs made ſome of the more induſtrious *Artiſts* attempt, by the ſame Method, to trace the Uſe and Action of the other Parts, which now appeared to them as ſo many *Appendages* to *Harvey*'s *Syſtem*.

By *Experiments* and *Anatomy*, the learned *Pecquet* traces the Chyle into the Subclavian Vein; the ingenious *Lower* accounts for a Variety of *Diſeaſes* of the moſt intricate Kind, and ſurpriſes us with the Certainty and Simplicity of the Cure; *Bellini* demonſtrates, that the Bile flows from, and not towards the *Liver*; *Pitcairn* reduces the Action of the *Lungs* to what was intelligible and great; one *Anatomiſt* dwells upon one Gland, another upon a different; ſome compleat their *Propoſals*, and others prepare Materials for ſucceeding *Compilers*; in fine, ſince *Harvey*'s Time our *Art* has been improved with incredible Induſtry and Succeſs; and both *Theory* and *Practice* have been gradually freed from a Deal of the Bombaſt and Metaphyſick which oppreſs'd them.

For my own Part, I have come to entertain pretty good Hopes, that *Diligence* and *Time* ſhall make *Medicine* a *Science*, which, from its Beauty and Certainty, ſhall engage every natural *Philoſopher* in its Study; we want only ſome more Leiſure to cut off from it the Remains of theſe *Luxuriances* it acquired in the Times of *Ignorance*, and to bring into Order the vaſt Multitude of looſe *Obſervations*, which *Anatomiſts* have made for the Uſe of *Compilers*; and to promote this, I reckon, was the particular Charge I was intruſted with, when I was raiſed to be *Chandos-Profeſſor* in this *Univerſity*.

It was by the *Laws* of the *Univerſity* I printed lately the firſt four Diſcourſes I had at the *Chandos-Lectures*, where I gave my Opinion very freely upon what I reckoned ſuperfluous in our *Art*, as likewiſe of the *Method* that was to be taken further to promote that *Study*, which I endeavoured to illuſtrate in explaining the Effects of *Cold* upon the *human Body*, and in accounting for ſeveral other *Phœnomena*, after a more ſimple and mechanical Way than had formerly been done.

In Purſuance of the ſame Deſign, I propoſe now to explain the *Syſtem* of the *Womb*, reckoning, that by this Time, there are Plenty of Materials to carry me thro' in the Undertaking. There is no Part of the Body that has been more ſtudied than this, nor, in my Opinion, with greater Succeſs; but from all the numerous and elegant *Obſervations* that have been made, nothing of a ſatisfying *Syſtem* has been yet formed. We cannot but admire each particular Part, while we ſee its intricate Structure laid open, and ſomething of its particular Deſign; but how all unite their different *Services*, and contribute to one and the ſame End, has not yet been diſcovered: This is the *Task* I now take upon me, which muſt add a Deal to the Value of every particular *Diſcovery*, if I ſucceed in it, and not a little raiſe our Thoughts of the Wiſdom of the great *Architect*, tho' the whole of the *Womb* be but a very private *Syſtem*, in Reſpect of the *Species* taken complexly.

I bring in the menſtrual *Flux*, in my Conſiderations on this Subject, only as an accidental *Affair*, and pretend to ſhew a more certain *Cauſe* of it than has hitherto been aſſigned; My *Opinion* in this Matter being ſingular, contrary to that of the whole Body of our *Faculty*, and in flat Contradiction to the Writings of ſome of the moſt diſtinguiſhed in it, for whom I have always had the greateſt Regard, I cannot be too particular in making an Apology for my Preſumption, but the Plainneſs and Certainty of my Arguments, and the many elegant Problems that at once reſolve themſelves from my Hypotheſis, oblige me to entertain it, tho' I deſign ſtill to lay my ſelf open to the Conviction of my *Friends*; after recommending to their Conſideration the following Reaſons, which induc'd me to reject the current *Hypotheſis*, and think of another.

The menſtrual *Flux* is a very conſtant *Phænomenon*, and, with People in Health, keeps its *Periods* very exactly; while the Maſs of Blood is influenced by a great many different *Cauſes*,

which

which muſt neceſſarily prevent its Accumulation in any certain *Proportion*; ſuch *Cauſes* are principally the Changes, of either the Quantity or Quality, of our *Food*, of our *Exerciſe*, and of the ſurrounding Atmoſphere, which we can never be ſure of, however we may pretend to manage the two former.

If any Perſon wants full Satisfaction as to the Influence occaſioned by theſe Cauſes, let him maturely conſider the ſtatical *Tables* of the ingenious Dr. *James Keil*, together with his *Aphoriſms*; where it is made out by *Experiments*, that the *Body* is in the moſt variable and fleeting Caſe imaginable, being ſometimes one Pound, ſometimes two, lighter and heavier, by moſt uncertain and ſudden Turns; and none of his Tables give Ground for the leaſt Suſpicion of a gradual Accumulation; whereas the Doctrine of the *Plethora* ſuppoſes a daily and gradual Accumulation of about ſix Drams in the *Maſs* of Blood; a ſtrange Suppoſition! while it is ſo irregularly ſupplied; and while there are ſo many *Secretions* ſo eaſily influenced by external Cauſes. As for *Sanctorius*'s Authority, who advanced, that at the End of each Month, there was an Augmentation of the Weight of the Body to one or two Pounds, I think I call it in Queſtion upon very good Grounds, his *Aphoriſm* upon this Head being delivered with a great many more, which, 'tis plain, the *Author* cou'd never have made any *Experiments* about, but which the *Theory* of the Time he lived in had made him conclude of Courſe: For it is eaſy to ſee, that the few *Experiments*, by which he found out the inſenſible *Perſpiration*, had inclined him to ſolve the moſt of the *Phœnomena* of the *Body* by Means of it, and look upon that as abſolutely neceſſary in the Theory and Cure of all Diſeaſes (*a*); while Mr. *Keil* ſhews that the greateſt Changes happen in that without any bad Effects at all, and that the *Diſeaſes* which were moſt ſuſpected to have followed upon its being ſtopt, ſuch as the *Cold*, were no-way dependent upon it: Finding then that *Sanctorius* took ſuch Liberty in his *Aphoriſms*, and that the monthly Accumulation is ſo oppoſite to the certain Obſervations of Dr. *Keil*, we reckon that we reject it upon

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(*a*) Sanctor. Aphor. 2. 3. 43. 75. 76. 77. § 1. &c.

good Grounds, as a mere Opinion of *Sanctorius*, which he has been led into from what he ſaw happen in Fact, *viz.* that Women have a monthly Diſcharge of about that Quantity, which would naturally prejudge him to think that there ſhould be a preceeding Accumulation, as *Hippocrates* ſuppoſed, and ſeveral others, who never conſulted the *Ballance.*

But I can refer the Juſtneſs of my Plea, upon this Head, to what every *Phyſician* has Occaſion to obſerve every Day in their Practice; the Quantity that Dr. *Friend* ſuppoſes daily to accumulate is five Drams and a third of a Dram. Now let us ſuppoſe after twelve Days Accumulation, that a Woman, ſubject to this Hœmorrhagie, is let Blood of to the Qantity of eight Ounces, or ſixty four Drams, of which there are frequent Examples; then, by this Means, the whole accumulated Quantity is deduced from the Maſs of Blood, and conſequently the twelve Days paſt will contribute nothing to procure the *Flux*; and therefore it will not appear till a Month after this extraordinary Loſs of Blood; that is to ſay, it will be forty two Days after the laſt Period before another happens. This Way of arguing is inevitable from the Suppoſition of the *Plethoriſts*; and I refer it to the Candor of every *Practitioner*, if ever they were ſenſible that drawing Blood in the Interval protracted the Flux one Day. For my Part, I have been Witneſs, with different Surgeons, of two, four, nay, in one Inſtance, of ten Pounds Blood being taken, in the Space between two *Periods*, where there was no raiſed Pulſe, without protracting the *Interval*; then, and for ſome Months after, the Flux kept the very ſame Times it had obſerved for ſeveral Months before, as did the *Saliva* and other Secretions. But 'tis needleſs to accumulate Particulars in a Caſe every one has Occaſion to try. The ſame Obſervations may be made as to Faſting and Purging, which have no Influence to alter this Flux, nor can they ever do it, except they be continued ſo long, that the Stomach decays with the other Powers of the Body, which are, in many Caſes, rather increaſed than diminiſhed by theſe Means: Which, to a Demonſtration, make out that this *Phœnomenon* muſt depend upon ſome other Foundation than that of a *Plethora* of one or two Pounds gradually accumulated, ſince the taking that from the *Maſs* no-way affects the *Period:* I ſhall not pretend to trace all the Refuges that may be taken to evite the Force of my Arguments, but only recommend my *Theory* of that *Phœnomenon* to be read without Prejudice, and to compare the current *Theory* and it together.

As to that Poſition of the *Plethoriſts*, that Women have come to the ἀκμὴ or Pitch of their Growth, before the Phœnomenon takes Place, I have been at Pains to enquire into this, and find the Fact every where contradicted, the Growth never being more remarkable than after this Time, at which the Body becomes every Way more healthful; while before the commencing of this Diſcharge all the Actions of the Body languiſhed; the Cauſe of which we ſhall explain afterwards.

And thus I have ventured, in every other Article upon this Head, to diſſent from the Multitude, not having yet learned, that *Hereſy*, or the diſſenting from the current Opinions of the generality, is accounted a Crime among Phyſicians. Our Glory, if I miſtake it not, is in a conſtant and gradual Reformation, and not in caballing, and making up of Parties, reſolutely to adhere to certain Poſitions, which only Bigots, thro' all the Quarters of the World, place a Merit in; they can take no Trouble to ſearch into Things, and ſo they are generally in the Wrong, but keep up their Credit by their Zeal for the eſtabliſhed Opinions, which is every where, by the Multitude, more eſteem'd than Truth.

CHAP. I.

Of the Structure of the Womb, the Ingraftment of the Ovum *upon it, and the Production of the Secundines.*

ONE *Stomach* (where the Food lies undiſtinguiſhed) ſupplying the Maſs of *Blood*, which is diſtributed thro' the different Parts of the *Body*, by the impartial *Heart*, muſt convince us that the *Variety*, which we find in the *Form*, *Velocity*, and *Exit* of the Liquors, after their Protruſion from the *Heart*, is owing to the *Circumſtances* of the Parts, thro' which they afterwards paſs; and conſequently theſe muſt be carefully remarked in the Solution of Problems relating to ſuch Caſes.

2. This is what the more judicious of our modern *Theoriſts* have at length become ſenſible of, ſo that we have now very few *Schemes* where the *Structure* of the Parts is not leſs or more regarded, tho' ſeldom is it enough, ſo as fairly to guide them in every Step of their Procedure; the ſmalleſt Hints ſet their buſy *Fancy* at Work, and ſuddenly engage them to adventure on a *Scheme*, with the Help of *Suppoſitions*, and *Compariſons*, which is generally well received, if it has ſo much *Art* in its *Compoſure*, as to be of a *Piece* with itſelf; tho' no leſs different from what takes Place in *Nature*, than if her *Works* had never been conſulted: I ſhall not add any Thing to what is already advanced, to ſhew how much this has been the Caſe of the *Schemes* hitherto prefer'd to explain the *Phænomena* of the *Menſes*; but ſhall immediately enter upon the *Structure* of the Parts concerned, and to their Guidance wholly reſign my ſelf.

3. The Womb is the great *Nurſery* of Mankind, contrived for the *Reception*, *Suſtenance*, and timeous *Diſcharge* of the *Fœtus*, but noways employ'd in the Concerns of the *Mother*, (tho' ſo intimately united to her, that it is juſtly look'd upon as one of her moſt diſtinguiſhed Members) its *Apparatus* is manifold and various, but at preſent we ſhall not meddle with any Part of it, except what may be ſubſervient to the Underſtanding of the particular Heads we have undertaken to explain in this Chapter.

4. *De Graaf* (*a*) reckons, that, from the *Os Uteri* to the upper Part of the *Fundus*, the Womb is three Fingers Breadth; and that at the *Fundus*, meaſured a-croſs, it is two and an half; and at the *Cervix* ſcarce two: In Infants he reckons its Weight to be a Dram, and ſometimes a Dram and an half; in *Women* paſt the Time of Child bearing, and *Virgins* come to *Puberty*, he finds it to be of the ſame Weight; and for the moſt Part, to weigh from an Ounce to an Ounce and an half; ſo that

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(*a*) De Graaf de mulier. organ. Cap. viii.

that after *Puberty* the *Womb* does not encreaſe, except in extraordinary Caſes.

5. The ſame *Author* obſerves a conſiderable Diſparity in the different Parts of the Womb, as to their Firmneſs and Strength; the outer Part of the *Fundus*, he tells us, is not ſo firm and nervous as the inner, nor yet as its neighbouring Part the *Cervix* (*b*); and if we further conſider, that the *Arteries* enter into the Womb below the *Tubæ* (*c*), in large Branches, that are much weakned before they reach the vertical Parts, where the Veins likewiſe are very ſmall and weak; and that the round Ligaments, by being inſert into the Lateral Parts where they ſpread widely (*d*), contribute very much to ſtrengthen them, while the vertical Part has no ſuch Advantage: We muſt therefore be convinc'd, that the vertical Part is much weaker than any other Part of the *Fundus*, or yet the *Cervix*, which, beſides what Advantage it has by its own Compoſure, is likewiſe ſtronger than the *Vertex*, by being intimately

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(*b*) De Graaf de mulier. organ. p. 106. (*c*) Idem, Tab. 1. L. T. V. (*d*) Idem, p. 149.

timately join'd to the Bladder and laſt Gutt (*e*), as the *Vagina* is (*f*).

6. *Malpigius* who gives us the Structure of the *Body* of the *Womb*, without diſtinguiſhing its Parts, tells us, that there run, below the outer *Membrane* that covers it, Courſes of Muſcular *Fibres* linked and join'd together, ſo as to form a Kind of Net-work; whereof alſo many, looſely ſcattered, run thro' its whole Subſtance in irregular Courſes, ſo as to make up the greateſt Part of the Bulk of the Womb (*g*).

7. He adds, That Courſes of the ſame *Fibres* run along its Concave or inner Side, but determines nothing of their Order (*h*). *Ruyſch* is very particular in his Deſcription of thoſe at the *Fundus Uteri*, he tells us they ly in ſo many circular Courſes round that Part, ſo as to make up a particular Muſcle (*i*).

8. The Concave ſurface of the *Fundus* is found ſtretch'd and ſmooth without an inner Membrane (*k*), but that of the *Cervix* abounds with

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(*e*) De Graaf, p. 94. (*f*) Ruyſch theſ. viii. p. 9. (*g*) Malpig. diſſert. epiſt. ad Sponium de uteri compage in mulier. (*h*) Idem, ibid. (*i*) Ruyſch adv. Decas 2. No. X. Tractatio anat. de muſculo in fundo uteri. (*k*) Morg. Adv. IV. p. 47.

with wrinkling Plies (*l*), which hang down ſo looſe that *Morgagni* calls them Valves (*m*), produced from the Duplicature of its inner Membrane.

9. Betwixt the Interſtices of the *Fibres*, ſcattered thro' the Subſtance of the *Womb* (§ 6.), there are ſtretched ſoft yielding *Membranes*, which, as the *Fibres* themſelves, muſt ly in very different Plans; along theſe *Membranes* are ſpread vaſt Numbers of large *Sinuſes*, which have Paſſages by which they mutually correſpond (*n*); theſe *Sinuſes* occaſion the Poroſities ſo much obſerved in cutting thro' the Subſtance of the Womb (*o*), and are equally in the *Cervix Uteri* and the *Fundus*, but not in the *Vagina* (*p*).

10. The Spermatick and Hypogaſtrick *Arteries* and *Veins*, that ſerve the Body of the *Womb*, and theſe *Branches* of the Hypogaſtricks that ſerve the *Vagina* are very much folded and twiſted in their Courſe thro' theſe Parts; and

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(*l*) De Graaf, p. 108. (*m*) Morg. Adv. I. p. 13. (*n*) Malpig. diſſert. epiſt. ad Sponium de uteri compage in mulier. (*o*) Morg. Adv. IV. p. 47. (*p*) Idem, Adv. I. Tab. 3.

and the *Branches* of the different *Arteries* inoſculate frequently one with another, as do theſe of the Veins (*q*).

11. Both *Arteries* and *Veins* communicate with the *Sinuſes*, and the *Sinuſes* open into the Cavity of the *Fundus Uteri* (*r*): This Way betwixt the Arteries, Sinuſes and Cavity, in a Subject *Morgani* examined, was ſo very patent in the Ninth Month of Gravidation, that the little Finger entred the narroweſt Part of it (*ſ*).

12. Moſt of the older Writers in Medicine had a Notion of Paſſages from the Blood Veſſels to the Cavity of the *Fundus Uteri*; and aſſerted, that both the *Lochia* and *Menſes* flowed by them (*t*): And now we have it demonſtrated, that it is to the Extremities of theſe very Paſſages, that the *Placenta* adheres (*u*); which is reſtricted to the vertical Part of the Capacity of the *Womb*, *i. e.* to the Place where the circular *Fibres* (§ 7.) are ſeated (*x*); and that in all *Poſitions* of the *Womb* (*y*).

(*q*) De Graaf de mulier. organ. Cap. vii, viii. (*r*) T. Bartholin. anatom. reform. Lib. 1. Cap. xxviii. (*ſ*) Morg. Adv. IV. p. 48. (*t*) Fœſii Oecon. Hip. vide κοτοληδονες. (*u*) Morg. ibid. (*x*) Ruyſch Adv. Decas 2. No. X. (*y*) Devent. ars obſtetri. cap. ix.

13. Nay *Morgagni* by diſtinct and repeated Enquiries has made out, that the *Menſtrua* have no Exit either by the *Vagina* or *Cervix Uteri*, but from the *Fundus* only, from every Part of whoſe Capacity they equally flow (z); ſo that we have the greateſt Evidence, that the *Lochia* and *Menſtrua* flow from the ſame Parts, and that it is to theſe very Parts the *Placenta* is fixed; which gives us the moſt ſatisfying Argument that theſe Paſſages were primarily deſigned for the Service of the *Placenta*; and it will ſtill appear, with greater Evidence, upon conſidering the Circumſtances of the *Ovum*, after it has arrived at the *Fundus*, by the *Tubæ Fallopianæ* from the *Ovarium*, which we are now to enquire into.

14. From the Time of Conception there is obſerved a gradual Change in ſome of the *Ova* for ſome Days, till at length Part of their outer Cover points outwards, burſts, and is delivered of the *Ovum*, which is immediately received by the *Tubæ Fallopianæ*, and tranſmitted to the *Womb* (a).

(z) Morg. Adv. I. p. 45, 46. Adv. IV. p. 48, 49. (a) De Graaf de mulier. organ. p. 310, 311, 312, 313.

15. The Part of the *Ovum* thus ſeparated is encloſed in a double Membrane, that every where appears of a Piece (*b*); and there is left behind in the *Ovarium* its third Membrane, which is very thick, and tinged with Blood thro' the whole of its concave Surface, which diſcovers that the Body of the *Ovum* has been ſeparated with Violence from its Seat; and that it is received into the *Tubæ Fallopianæ* with open Veſſels, thro' the whole of its Surface (*c*).

16. Upon a compleated Act, both the *Tubæ Fallopianæ* and *Fundus Uteri* are full of the *Semen* (*d*); which ſeems to have much the ſame Properties with the White of the Egg, with which the Chick is nouriſhed; and conſequently as ſoon as the *Ovum* is ſeparated from the *Ovarium*, it is engaged in the Midſt of a Liquid capable to be abſorbed, (by the open Veſſels round its Surface, (§ 15.) or other Abſorbents, which few Parts want) and at the ſame Time fit to nouriſh and diſtend it; and hence we may underſtand, why the Conception does not hold, when the Bulk of the *Semen*

(*b*) De Graaf de mulier. organ. p. 292. (*c*) Ruyſch Theſ. VI. p. 17, 18, 25. (*d*) idem, ibid. p. 15.

comes away, as *Hippocrates* and *Ruyſch*'s Correſpondents obſerved (*e*).

17. The *Ovum*, upon its Arrival at the *Fundus*, is ſpherical (*f*), and very little in Reſpect of the Capacity of the Place that receives it (*g*); and continues to float looſe for ſome Days (*h*); whence it muſt neceſſarily follow, that it is altogether uncertain how it will fix, *i. e.* what Part of it upon fixing ſhall be next to the vertical Part of the *Fundus*, what Part next the Entry to the *Cervix*; and ſo on; and therefore it muſt be allowed, that in different Women, or in the ſame Woman, at different Times, the *Ovum* will obtain very different Poſitions.

18. After the *Ovum* has been for ſome Time nouriſhed with the *Semen*, it turns fibrous round its Surface, and thus in every Part of it diſcovers the Rudiments of the *Placenta* (*i*).

19. After the *Ovum* has been ſomewhat longer in the Womb, and arrived at that Bigneſs, as to

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(*e*) Ruyſch Theſ. VI. p. 16. Hip. de natur. puer. (*f*) De Graaf, p. 262. (*g*) Compare the Ova, Ruyſch Theſ. Tab. 1. and the Capacity of the Fundus, as deſcribed by Morgagni, Adv. V. Tab. 3. (*h*) de Graaf, p. 263. (*i*) Ruyſch Thec. G. Repoſ. III. No. VII.

to come in Contact with its Sides; (the Time of which may be determined from comparing the Capacity of the Womb (§ 4.), with the given Egg, or from the *Ovum* turning from a Sphere to a Spheroid, with a ſhorter and longer *Axis*, as the Shape of the Womb muſt determine it to be at firſt Meeting) *(k)*; then it loſes its fibrous Form at one of its Extremities, which turns membranous *(l)*.

20. This membranous Part turns ſtill larger and larger, in Reſpect of the Fibrous *(m)*; ſo that in the laſt Months we know it is vaſtly larger than the Fibrous; whereas theſe Figures of *Ruyſch*, to which we have referred, ſhew, that at firſt the fibrous Part was by far the largeſt; and to theſe the Obſervations of the moſt accurate *Anatomiſts* agree. *Ruyſch* was always ſurpriſed at the Largeneſs of the *Placenta*, or fibrous Parts in the firſt Months *(n)*; tho' the Strangeneſs of the Sight made him take a Notion, that it was only accidentally acquired *(o)*: He further informs us, that others obſerved the

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(*k*) De Graaf, p. 265. (*l*) Ruyſch Theſ. VI. Fig. 2. Tab. 1. (*m*) Idem, ibid. Compare Tab. 1. Fig. 3, 5. Tab. 2. Fig. 4, 5. (*n*) Idem, Adv. anat. decas 2. p. 29. Catalog. rarior. 170. (*o*) Idem Theſ. VI. p. 58, 78.

ſame Thing, and that they, from finding ſo large a *Placenta*, come away expected to find a large *Fœtus*, and thereupon gave Medicines to bring that away next, tho' it had already paſt inviſible, by Reaſon of its Smalneſs (*p*): *De Graaf* was no leſs ſurpriſed with the early Largeneſs of the *Placenta*, which he found frequently in the firſt Months ſurrounding the whole *Fœtus*; tho' others were at ſo great a Loſs what to make of it in theſe Caſes, that they entertain'd Conjectures of its being one of the Moles that are ſo much talk'd of (*q*). I have examined *Placentas* my ſelf, about the ſecond Month, at which Time I found them exceedingly large, and as genuine as what we meet at the ninth Month.

21. We find then, that the *Ovum* is fibrous, that is, diſcovers the *Placenta* equally in every Part of it, till once it comes contiguous to the Womb, (§ 18.) at which Time it turns membranous at one of its Extremities, (§ 19.) which muſt be allowed to be the Extremity next to the *Cervix Uteri*, we finding the *Chorion* and

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(*p*) Ruyſch Theſ. VI. p. 59. (*q*) De Graaf de mulier. organ. p. 294.

Amnion always there, while the *Placenta* is at the vertical Part of the Capacity of the Womb, (§ 12.) and after this the membranous Part, tho' leaſt at firſt, always increaſes, till it becomes vaſtly larger than the other (§ 20.), in the mean Time we know it was purely accidental what Part was next the *Cervix*, and what Part anſwer'd to the Cavity of the *Fundus* (§ 17.), and therefore it muſt be accidental, what Part of the *Ovum* becomes the *Placenta*, and what the *Chorion* and *Amnion*, *i. e.* every Part of the *Ovum* is capable to be either, according to the Place it is poſſeſſed of, which makes us eaſily underſtand, that the Membrane that is upon the convex Side of the *Placenta*, is nothing elſe but a Continuation of the *Chorion*, and that it cannot be ſeparated from the other Parts of the *Placenta*, otherwiſe than one Ply of a Membrane can be ſeparated from another, as *Ruyſch* frequently obſerves *(r)*: How they come to have ſuch different Appearances will be underſtood afterwards.

22. We further underſtand, from what has been advanced, that the whole Capacity of the

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(r) Ruyſch Theſ. V. p. 27.

Fundus is ſtor'd with Paſſages that give eaſy Acceſs to the Maſs of Blood (§ 11.), and that the whole Surface of the *Ovum* is ſtor'd with theſe Paſſages, by which it formerly communicated with the *Ovarium*, and other Abſorbents (§ 15.); therefore, when the *Ovum* has arrived to the *Fundus*, and increaſed to that Bulk, as to come in Contact with its Sides, of Neceſſity the open Veſſels of the *Fundus* and *Ovum* muſt meet, and inoſculate, (except thoſe of the Egg that ly over the Entry to the *Cervix*) after which none of them can enlarge, but in Conjunction one with another.

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CHAP. II.

23 *Of the Time of the Eruption, Periods, and Stopping of the Uterine Hæmorrhagie.*

PROP. I.

THE Body ſtops not in its *Growth*, becauſe its ſolid Parts are ſo far ſtretched that they can ſtretch no further, but from the Want of a ſufficient *Force* to ſtretch them.

If after the Body has come to its full *Growth*, the lateral Preſſure of the Fluids in any particular Part be augmented, (as always happens at theſe Parts that ly near Veſſels, where the ordinary Courſe of the Blood is retarded, or altogether obſtructed, while the Velocity and Quantity of the Maſs is unchanged (*a*) we find the *Parts*, thus affected, increaſe conſiderably in their *Bulk*; thus ſometimes we have the *Liver*, *Spleen*, *Kidneys*, and now one *Limb*, then another, of enormous *Bulk*, from the Blood being ſtopt in ſome of their Veſſels; and therefore the Body is not fixed as to its *Bulk* or *Growth*, from the Incapacity of its Parts to yield, but from the Want of a ſufficient Force to diſtend them.

PROP. II.

24. THE original *Communications* and *Paſſages* among the Veſſels becoming more free, and the Courſe of the *Liquors* upon that Account more eaſy, the Body comes to its ἀκμὴ.

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(*a*) Lower. de cord. Cap. 2. Cauſæ inteſtinæ mutationis cordis motus Artic. 2.

The more the *Veſſels* of the Body diſtend, the freer is the Courſe of the *Liquors* thro' them, therefore the whole Time that the Body is growing, the *Circulation* and *Secretions* are ſtill becoming more and more free; and conſequently the lateral Preſſure of the *Liquors* comes to be leſs and leſs; *i. e.* the *Cauſe* that diſtends the Body is ſtill growing weaker: Since then the ſenſible and preſent *Cauſe* of the Growth of the Body, evidently loſes itſelf, while it exerts its *Force*, we have no Ground to ſearch for any other Reaſon why at length it ſhould become ineffectual for that End; eſpecially ſince we find that upon increaſing the Force upon any Part (as happens in the preternatural Caſes we mentioned, § 23.) there commenceth a new *Growth* again.

25. *Schol.* Some may ſuppoſe, to evite the Concluſion I have made in this Propoſition, that the Force of the Heart increaſes, and the *Aorta* widens ſo much in the Time the Branches are diſtending, that they can ſupply the Branches as fully and quick as before, and ſo the Circulation will be ſtill as difficult as formerly: To anſwer the Objection it muſt be remembred,

bred, that the Number of diſtended Branches in a Perſon come to his full Growth, is greater than what it was in the Embryo, and ſo the Velocity of the Blood muſt be allowed to be then in the Branches, leſs than in the Trunk, in a greater Proportion, than what it was before (*b*), ſuppoſe the Strength of the Heart and the Quantity of Blood be allowed to be proportionably augmented as the Branches are. But in caſe this Argument ſhould be ſtill doubted, I would have theſe Obſervations conſidered, by which it appears in Fact, that the Force of the Blood is ſo much augmented by a ſmall Stopage of its Courſe, that in theſe Caſes it always obliges the Veſſels to a further Diſtention; ſo it muſt be the Freedom of the Circulation that prevents the further Increaſe of the Body; which is ſo true, that in theſe Caſes, where the Reſiſtance gradually increaſes, the Veſſels are ſure to do the ſame: Thus in Steatomatous Tumours, where there is a perpetual Increaſe of Matter in the *Foliculus*, which gradually compreſſes its Veſſels, there is likewiſe

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(*b*) Keil Tentam. 2.

wiſe a perpetual Increaſe in the Veſſels; ſo that as the Matter increaſes, that compreſſeth the Veſſels, the Veſſels increaſe; which is a plain Demonſtration, that thereby the Force of the Blood is increaſed upon them. From all which it is plain, that if the Circulation did not turn gradually more free and eaſy, there would be a perpetual Growth: Nor is it difficult to gueſs, how this gradual Eaſineſs ſhould happen, while the Body is growing; we ſee what a ſmall Orifice in a Bladder does prevent it to be blown up, the ſame Way it is that a ſmall Aperture in any one Veſſel, correſponding with a great many other Veſſels, gives ſuch a Vent to the Liquors, as in a great Part to deſtroy their lateral Force: And conſequently in the Time the Body is diſtending, and the Communications betwixt the Arteries and Veins inlarging, (by which the Blood paſſes more freely to the paſſive Veins) and ſome Excretory Ducts are made patent, which formerly were ſhut up; and theſe that from the firſt were patent made wider; we muſt own, that the Reſiſtance to the circulating Blood muſt decreaſe in a greater Degree than what the Force of the Heart and the Dimenſions of the

Aorta can be ſuppoſed in an uniform Way to increaſe. Which is the Foundation of the Truth of our Propoſition.

PROP. III.

26. THE Eruption of the *Menſes* is the Cauſe of the Womb's coming to its ἀκμὴ.

The Womb was ſtill increaſing to the Eruption of the *Menſes*, but not after (§ 4.), except in extraordinary Caſes; and by the Eruption the lateral Force of the *Liquors*, or the Force that diſtends the Veſſels of the *Womb*, is neceſſarily broke: So that the *Womb* gives over growing at the very Time that this natural *Cauſe* of its *Growth* ceaſeth: And therefore it is juſt to reckon it the only *Cauſe* which then procured that *Effect*; eſpecially ſince upon the *Placenta*'s being applied to the Extremities of the Veſſels of the *Womb*, (which is a new Impediment to the direct Courſe of the Liquors, and ſo muſt renew their lateral Force) the *Womb* commenceth a new *Growth* again.

27. *Schol.* The Spermatick *Arteries* that ſerve the *Womb*, and the Hypogaſtrick *Arteries* that

ſerve the *Womb* and *Vagina*, mutually inoſculating (§ 10.); and the *Sinuſes* that ly thro' the *Fundus* and *Cervix Uteri* communicating likewiſe (§ 9.); and the Hypogaſtricks and Spermaticks opening into the *Sinuſes*; which again open into the Bottom of the *Womb* (§ 11.); it follows that, upon theſe *Paſſages* being ſo diſtended as to give Acceſs to the Blood into the *Cavity*, not only the *Sinuſes* of the *Fundus*, but likewiſe of the *Cervix Uteri*, will have the Force of the Blood much diminiſhed thereby upon their Sides; as it will be likewiſe upon the Sides of their *Arteries*, and the *Arteries* of the *Vagina*; hence all the Parts of the *Womb* will ſtop in their *Growth* at once; and when a Woman is with Child, and thereby the ſame Impediment is procured to the Blood at the Womb, that it had before ever the Paſſages into the Cavity yielded to it; then all theſe different Parts muſt diſtend proportionably to their Strength; and thus we find in Fact, that not only the *Body* of the Womb, but the *Vagina* likewiſe, grows larger in a Woman with Child; the Neceſſity of which no Body can be ignorant of, tho' they may well admire the Way how it is ſo ſeaſonably procured; but theſe Parts diſtend in very different Proportions, as ſhall be ſhown afterwards.

PROP. IV.

28. THE gradual Increaſe of the *Womb* is the Cauſe of the Eruption of the *Menſes*.

From the firſt Frame of the *Womb* there were ſtill natural *Paſſages* from its Arteries to its *Cavity* (§ 11, 36.); the Straitneſs, Length, Turns of the *Veſſels*, and lateral *Sinuſes*, that make up that Paſſage, together with the Parts that ſecure them, and the Freedom of the Circulation thro' the intermediate Branches; were the only *Cauſes* that prevented the Blood from reaching the *Cavity* at firſt; now, as the *Womb* increaſeth with the other Parts of the Body, the Blood muſt have Opportunity ſtill to penetrate further and further into the *Paſſage*, and the *Womb* continuing to increaſe to the Eruption of the *Menſes* (§ 4.); we muſt allow that to that Time the *Impediment*, which kept the *Eruption* from taking Place, was daily removing; ſo that the gradual *Increaſe* of the *Womb* is a preſent and natural Cauſe to procure the *Menſes*; and ſince it was ſtill acting till they broke out, it is to be allowed the genuine *Cauſe*.

29. *Schol.* I. From this Propoſition we ſee that the *Menſes* appear in Courſe from the uniform Actions of the Body, which, beſides this, muſt make a great many other Alterations both in its Liquids and Solids: Thus in *Infants* and *Children* we find the *Bile* and *Urine* of quite different Forms from what they are afterwards; which can be attributed to nothing but the different *Apertures* and different *Forces* which the Veſſels gradually acquire; the *Emulgents* are bigger at the Age of Fourteen than the *Aorta* was at Two; and thus proportionally the Branches will alter; from ſuch Changes we may likewiſe deduce the Appearance of the *Semen* at a certain Time, notwithſtanding that the *Teſtes* with their *Apparatus* were compleated long before, without ſeeking for any new *Cauſe* acting upon the Body to produce ſuch a new *Effect*.

30. *Schol.* II. Since after Child-bed we find that during the whole Time the *Womb* is reducing itſelf, it has a continual *Flux*, till it arrives

at its ordinary Bigneſs, however much the Body is exhauſted at that Time; we may therefore conclude, that when it is ſtretched any Degree above that Size, that the *Paſſages* are ſo open as to make the *Flux* neceſſary, whether the Body be *Plethorick* or not; and conſequently, when at that Size, theſe Paſſages muſt want but a very ſmall Degree of Diſtention to allow the Blood to paſs them: Which Conſideration ſets the Circumſtances of the *Womb* in a very clear Light with reſpect to the *Phœnomenon* we are explaining.

31. *Schol.* III. The Hypogaſtrick and Spermatick *Arteries* that ſerve the *Womb* are larger, in reſpect to the Bulk of it, than any other of the *Arteries* of the Body, in reſpect to the Bulk of thoſe Parts they ſerve, and they enter the Womb in a very direct Courſe; ſo that the *Womb* muſt receive a much greater Quantity of Blood, than any other Part; yet all of it is returned again by the *Veins* without undergoing any Change, except the ſmall Quantity that is ſpent in moiſtening and lubricating the *Cavities*, till the *Menſes* break out; and it is this eaſy Courſe which the Blood has by the *Veins* that diverts it

ſo long from the *Emiſſaries*; and that makes it have ſuch a ſlow Progreſs towards the *Sinuſes*; for it is certain that the Veins always increaſe with the Arteries, and ſo the Circulation by them turns always more and more eaſy, as the Parts increaſe; and thus the *Diverſion* of the Blood from the *Emiſſaries*, increaſes as the Parts increaſe, yet theſe muſt receive an Augmentation, (they having their *Riſe* in the Sides of the enlarged *Artery*, which makes their *Mouths* with the *Artery* turn larger) tho' it be very inſenſible, upon Account of the increaſing *Diverſion*: By all which we underſtand that the Blood may be very near the Confines of particular Veſſels, at Parts which are daily increaſing, and yet take a long Time to reach theſe Veſſels; nay, perhaps it may never reach them in a regular Way: For Example, if the Veins of the intermediate Veſſels, notwithſtanding all the Diſtention that is made, are able to intercept the increaſing Quantity of the Blood till once the ἀκμὴ of the Part happens; and ſuch a Caſe, if I miſtake it not, takes Place at the *Breaſts*; at which, in *Infants*, upon tying the Navel-ſtring, the *Sinuſes* are filled, tho' afterwards they are never ſo, till the Time of Pregnancy, or that ſome evident Diſeaſe cauſes it; which Caſe I beg leave to inſiſt upon, it tending much to give a right Notion of our Doctrine.

32. The firſt Queſtion upon the Head is, Why the *Breaſts* ſhould ſwell with *Milk* two or three Days after tying the Navel-ſtring? Which is eaſily ſolved, upon conſidering the Riſe of the umbilical Arteries, which is either from the internal *Iliacs*, or from the Extremity of the *Aorta* (*c*); ſo that they ly very near the *Epigaſtricks*, and conſequently when they are deſtroyed ſuddenly, as happens at the Birth, the neighbouring Veſſels muſt receive a ſudden Shock, while the Blood, that uſes to paſs the umbilical Veſſels, is oblig'd to diſtribute it ſelf among them; and ſo with the Reſt the *Epigaſtricks* will be affected: Hence the mammary Artery, that inoſculates with them, will either receive a Share of the Augmentation, or, at leaſt, will be obliged to diſtribute elſewhere that Part of its Blood that uſes to deſcend by them: And ſo by either Suppoſition a

larger

(*c*) Morgag. Adv. IV. P. 85, 86.

larger Share of Blood will be forced in upon the *Breaſts*, and thereby that Secretion of *Milk* take Place, which we obſerve at this Time.

33. Here we cannot pretend a general *Plethora* as the Cauſe; for this happens before the Child has received any Thing but the ſmall Quantity of a Purgative, with which it is ſerved for ſome Days; and the *Breaſts* not being much ſwelled till the third Day, ſhews that they gradually increaſe after the aboliſhing of the umbilical Arteries; and that while the *Maſs* is rather diminiſhing than increaſing; ſo that this *Phœnomenon* muſt happen in the natural and obvious Way we have explained; where, by the by, I muſt obſerve, how much eaſier it is for Veſſels to be affected from their neighbouring Veſſels, than from the Changes of the Maſs, we having no Example of any extraordinary *Eatings* or *Drinkings*, or of the higheſt *Fevers*, where the Velocity is much increaſed, ever affecting the *Breaſts*; while here we ſee that the deſtroying the neighbouring Veſſels does it; but more of this afterwards.

34. Now what I conclude from this *Phænomenon* is, that from the Beginning the ſecretory *Ducts* of the *Breaſts* are intire, and the *Paſſages* from the *Arteries* to them patent and open; but, after this, the Secretion not being favoured by draining of the *Milk*, the extraordinary Supplies of the mammary *Artery* beſtow themſelves otherwiſe, and ſo this *Secretion* appears no more, as in *Nurſes*, after the Child is weaned, till once there be ſome new and ſudden Shock made upon them again; of which afterwards.

35. We muſt own that the *Hypogaſtricks* ly nearer the umbilical *Veſſels* than the *Epigaſtricks*, and ſo the *Womb* ſhould be more affected, by our arguing, upon tying the Navel-ſtring; and undoubtedly it is ſo, but a ſudden *Force* cannot break thro' the Paſſages of the *Womb* ſo eaſily, as thoſe of the *Breaſts*; for we find a Woman is at leaſt a Month after nurſing before ſhe menſtruates; whereas the Sinuſes of the *Breaſts* are filled three Days after tying the Navelſtring, or three Days after Child-bed, which ſhews that there is a much eaſier Acceſs to them than to thoſe of the *Womb*; and there-

fore, tho' the Force of the diſtributing Blood appears at the *Breaſts*, there is no Reaſon why it ſhould do ſo at the Womb, it being juſt to ſuppoſe that the extraordinary Share of Blood, that was oppreſſing theſe Parts, has diſpoſed of itſelf by Ways that yield to it eaſier than thoſe of the Womb, before it could paſs there; tho' there are ſome Inſtances too of its penetrating the *Womb* about that Time (*d*); In which we muſt ſuppoſe the *Womb* to have been more patent than ordinary, or ſome other extraordinary *Cauſe*, as we muſt always allow in every other Caſe, when the *Menſes* happen before the ordinary Time; of which I had one Inſtance in a Girl ſeven Years old, who, in that Age, had three regular and ſucceſſive Courſes of the *Menſes* (but none for theſe four Years paſt) at which Time, I ſuppoſe that the *Epigaſtricks*, or ſome other of the neighbouring Veſſels were compreſſed by ſome Tumour, or that ſome other Cauſe took Place, which made the *Womb* have a larger Share of Blood, ſo as to occaſion theſe *Menſes*, till that extraordinary Cauſe ceaſed.

36. But

(*d*) Bohnii Circul. Anatom. Progym. XVI.

36. But whatever was the extraordinary *Cauſe*, it is plain from ſuch Examples, that from the *Birth*, the *Paſſages* thro' the *Womb* are patent to the Blood, but that, till the larger *Arteries* are much enlarged, it does not enter them in ſuch *Quantity*, and with ſuch *Velocity*, as to fill all the intermediate *Branches* and the *Emiſſaries* at once; ſo that the *Menſes* depend upon the enlarging of the *Womb*, as we have advanced in the Propoſition, and ſince it is always enlarging till they break out, as we likewiſe obſerved, we muſt confeſs that a Cauſe moſt natural to procure the *Menſes*, was ſtill acting till they appear'd.

37. *Schol.* IV. Here it will not be amiſs to conſider what muſt neceſſarily happen thro' the *Body*, and particularly at the *Womb*, and adjacent *Parts*, upon the Blood's getting into the *Sinuſes* and filling them: 'Tis from this that we account for the whole Symptoms that appear at the Eruption of the *Menſes*; and at theſe Times, when they are irregularly ſuppreſſed; which, to every *Philoſopher*, ſhould give more Satisfaction than what is advanced from a doubtful *Hypotheſis*.

The *Sinuſes* of the Womb being equally ſpread thro' every Part of it, vaſtly numerous, conſiderably large, and communicating one with another, as we took notice (§ 9.); then of Neceſſity, when they are filled and diſtended, the whole Veſſels that run among them muſt be compreſſed, *viz.* the whole *Arteries* and *Veins* by which the Blood circulates thro' the Womb: And conſequently, the great Quantity of Blood that uſes to paſs freely by the *Spermaticks* and *Hypogaſtricks*, will undergo a very conſiderable Retardment, and the Volume of the Womb it ſelf will be enlarged ſome-what and ſtiſned: Which Reaſoning I hope will be the more readily allowed, that we ſee the like *Phænomena* happen at the *Breaſts* upon filling of their *Sinuſes* (which, according to *Malpigius*, are much of a Piece with thoſe of the Womb) (*e*); it is then indiſputable, that upon filling ſuch a vaſt Number of *Sinuſes*, in ſuch a compact Body as that of the *Womb*, the Circulation, in a great Meaſure, muſt be ſtopt in that Part, and conſequently, the Blood that uſes to paſs there, will be obliged to diſtribute

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(*e*) Malpig. de Uteri Compage in Mulier.

bute it ſelf thro' the neighbouring Parts, which Addition to them muſt oppreſs them not a little: Hence all the Uneaſineſs that is felt before the *Eruption* among the Branches of the *Aorta deſcendens*; the Pain of the *Back*, *Colicks*, *Nauſeouſneſs*, &c. And the more tender any of theſe Parts happen to be, the ſpreading Force will be the more perceiv'd at them. Now a great many of the lower Parts of the Body being thus harraſſed, the Reſt, with whom they have an evident Connexion and Sympathy, muſt be diſordered ſome-what at the ſame Time; eſpecially the Head, which in moſt People is ſo eaſily affected, that the leaſt Diſorder, tho' in the moſt diſtant Parts, diſturbs it: But tho' at this Time the whole Body ſuffers, yet it is eaſy to obſerve that the Parts adjacent to the Womb do ſo moſt remarkably; as likewiſe the *Breaſts*, from the Connexion they have with the *Epigaſtrick Artery*.

38. So that upon the Blood's getting into the *Sinuſes*, we ſee all the *Symptoms* muſt take Place, that were reckoned to come from a *Plethora*, and muſt continue till it has forced its Way into the Cavity of the *Womb*, by the natural

Paſſages that ly betwix the *Sinuſes* and it; for which it has now acquired a very great Force, ſince the Courſe, by the intermediate Branches, is ſo much retarded, and ſo the Force of the whole Blood that enters the Arteries made to land on the Sinuſes.

I own that much the ſame Symptoms might be produced from a *Plethora*; but then I would expect a much greater one than what would be occaſioned by the Addition of twenty Ounces extraordinary, which is all that is pretended by thoſe who ſtand up for it in this Caſe: It is certain, that where the Perſon is ſound, the *Symptoms* leave them the firſt Day of the *Flux*; that is, before a Fourth of the *Plethora* can be diſcharged; ſo that if the taking away of five Ounces, takes away the *Symptoms*, this Quantity and more being ſupplied by next Meal, the *Symptoms* ſhould again be as violent as ever: Nay, let us ſuppoſe, that, after the *Flux* is quite over, and the *Plethora* of twenty Ounces evacuated, we have only a Fourth of what *Sanctorius* allows for our Food a Day, in our Blood at once, that is, two Pounds *(f)*; then at that Time

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(f) Sanctor. de ponderat. Sect. I. Aphor. VI.

Time we have a Third more in our Veſſels than what the *Plethoriſts* reckon neceſſary to produce the *Uterine Effuſion*, and that without any Change in the Body.

39. As I have ſtated the Queſtion, none of theſe Inconſiſtences have Place; but, on the contrary, all the Concomitants of this *Phœnomenon* are more eaſily explained, and more fully, as we have ſeen: And how upon our *Hypotheſis* the *Symptoms* ſhould ſo quickly diſappear again, is no leſs evident; for what more reaſonable, if the Compreſſion of any Veſſels has produced any remarkable *Symptoms*, than that immediately they ſhould diſappear, when that Compreſſion ceaſes? Which happens upon the Blood's paſſing into the Cavity of the Womb; as by Sucking, the Stifneſs and Hardneſs of the *Breaſts* ceaſe with the univerſal Diſtreſs that is raiſed upon their Diſtention: And whoever will conſider what Quantity of Blood the *Hypogaſtrick* and *Spermatick* Arteries perpetually tranſmit to the Veins belonging to the Womb, muſt be perſuaded that their Communication being ſtopt, the whole Body, and particularly the Parts contiguous to theſe Veſſels, muſt be more

affected, than if the Maſs of Blood at once had been augmented by ſeveral Pounds, the *Paſſages* by which the *Aorta* uſes to diſcharge it ſelf, being now conſiderably leſſened.

40 *Schol.* V. For illuſtrating of what we have advanced in this Propoſition, it will not be amiſs to take Notice of the Changes which this *Phœnomenon* undergoes by Turns upon a Secretion of Milk at the *Breaſts*, and its giving over again; the Breaſts generally riſe and fall with the Womb; at the firſt Appearance of the Symptoms of the *Menſes*, the *Breaſts* are found protuberant and hard; at the Eruption they fall; and at every other *Period* they ſtill undergo the ſame Changes: We obſerved (*Scho.* IV.) that upon the *Sinuſes* being filled, the *Hypogaſtrick* Blood muſt in a great Meaſure be detained in the *Iliacs*, and conſequently the *Epigaſtrick* Arteries that ly next the *Hypogaſtrick* muſt have a great Shock upon them; ſo that the Blood will paſs in a larger Quantity than uſually into them, however diſadvantageous the Poſition be; whence the Blood of that Branch of the *Mammary* Artery, that communicates with them, will have a greater Reſiſtance in its

Courſe; and conſequently its neighbouring *Branch* that goes to the *Breaſts*, muſt have a greater Shock upon it, as we hinted before; hence the Veſſels of the *Breaſt* will ſuffer a greater Diſtention; all which Effects muſt diſappear again as ſoon as the Blood gets a free Paſſage into the *Womb*, for the contrary Reaſons.

41. At the ordinary Periods of the *Menſes*, the Retardment of the Blood at the Womb taking Place for a very ſhort Time, its Influence on the *Breaſts* is not ſo remarkable; but upon Pregnation, when the *Placenta* is clapt to the Paſſages (§ 12.) and kept for a long Time, during which the *Sinuſes* are ſtill diſtended; and conſequently the evaneſcent *Arteries* and riſing *Veins* continue to be conſiderably compreſſed, the *Breaſts* have all the while a laſting Shock upon them, their Veſſels are gradually widened, and a Way made to their *Secretory Ducts*, which, from the cutting of their *Navel-String*, were hitherto untouched; ſo that in the moſt Part of Women about this Time, the Milk begins to make an Appearance at the Breaſts, (a plain Demonſtration the Breaſts are affected

from the Connection of their Veſſels with theſe of the Womb, and not from a general *Plethora*, ſince at the ſame Time all the other Parts about are ſtarved) tho' in others, not till the Child is delivered, and thereby the *Womb* permitted to collapſe, at which Time the *Breaſts* get the ſtrongeſt Shoke of all; for in the Time of Pregnancy the Veſſels of the *Womb* are vaſtly enlarged, and ſo inhance a greater Share of Blood than ordinary, by which moſt of the upper Parts of the Body are ſtarved; which larger Share muſt now diſtribute itſelf again, and that ſomewhat precipitantly, becauſe of the ſudden Collapſe of the *Womb*; in which *Cataſtrophe* the *Epigaſtricks* muſt get the greateſt Share of the interrupted Blood, as we obſerved before; and thereby an extraordinary Attack be made upon the *Breaſts*: For now, not only the whole Blood of the inferior Branch of the *Mammaries* is turned in upon them, but a great Part of the *Epigaſtrick* Blood from the overflowing *Iliacs*; accordingly at this Time we find the Veſſels of the *Breaſts* ſo exceſſively diſtended, as to raiſe ſome Degree of a Fever till they are ſucked, which gives the crouding Liquors Vent at the Nipples. Thus we ſee how upon collapſing of the *Womb*, the Way from it, by the *Epigaſtricks* to the *Breaſts*, muſt be enlarged ; and at the ſame Time that the Reſiſtance of the Liquors at the *Breaſts* is in a great Part deſtroyed by the Sucking: Upon both which Accounts the Veſſels of the *Breaſts* get from all Quarters a much larger Share of Blood than ordinary; and particularly they make a much greater Demand upon the *Epigaſtricks*, which have never been allowed to recover their wonted Straitneſs; ſo that the Liquors continue the whole Time of the Sucking to have an eaſier Acceſs, and eaſier Exit at the *Breaſts*, which, all that Time, muſt make a greater Demand on the *Iliacs* than otherwiſe, and in Proportion defraud the *Hipogaſtricks*, the neighbouring Branches to the *Epigaſtricks*; and this is the Reaſon why the Veins at the *Womb* are now able eaſily to return all the Blood that is brought in by the *Arteries*, without allowing any of it to paſs to the *Sinuſes*. And thus the *Womb* is reduced to the ſame Circumſtances that the *Breaſts* are in for ordinary, in which the Blood has no Force upon the Secretory Veſſels: From all which we ſee a ſufficient Reaſon, why upon the Secretion of *Milk* in the *Breaſts*, the *Menſes* ſhould be ſtopt, *& vice verſa*; and what Analogy there is betwixt the Means, by which the *Menſes* and the Secretion of the *Milk* is procured. We find indeed in ſome Caſes, that however ſeverely a Woman be ſuckt, yet the *Menſes* will break out; but it muſt be obſerved, that this generally happens in thoſe, who have very little *Breaſts*, and commonly in their firſt Child, when the *Breaſts* are not yet fully broke, or accuſtomed to diſtend; in which Caſes, fomenting the *Breaſts* frequently, and keeping them warm, or according to *Hippocrates's* Rule (*a*), applying large Cupping *Glaſſes* to them, ſupport the *Nurſe*.

42. From theſe Conſiderations, we come to have a pretty clear Idea, in what Caſe a Woman may happen to be without any monthly Diſcharge, and yet be free of all Manner of Inconvenience, *viz.* if naturally ſhe has the Spermatick or Hypogaſtrick *Arteries*, much leſs than they are in other People, while the other *Arteries* are in their due Proportions, or, if any of

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(*a*) Aphor. 50. § V.

of the neighbouring Veſſels ſhould happen to be extraordinarily big, without theſe being alter'd: In both Caſes it will be the ſame, as if there was a perpetual Diminution of the *Iliac* Blood, as in *Nurſes*, in which the Blood does not reach the *Sinuſes* of the Womb, the Veins being ſufficient in them to carry back all the Blood that is brought in by the *Arteries*, as they are ſtill at the Breaſts, except in the Caſes when a Flood happens at them, which is the only Time their *Sinuſes* are employed; and ſuch Caſes, in which Women do never menſtruate, may be allowed to be as frequent, as theſe wherein it has been found, that ſome People never have had any Snot, Tears, and other Secretions, of which there are Inſtances, tho' not many, and theſe, in my Opinion, to be accounted for after the ſame Manner, that we have accounted for the total Want of the *Menſtrua*.

43. From our Doctrine of the mutual Dependence of the *Milk* and *Menſtrua*, upon each others Suppreſſion, it may be objected, That upon this Suppoſition, we ſhould never find the *Milk* and *Menſtrua* taking Place at the ſame

Time, which yet is found not infrequently; to account for which I would have it obſerved, that 'tis only the extraordinary Share that the *Epigaſtrick Arteries* carry from the *Iliacs*, that can influence the *Menſes*; and therefore, if this return again, the *Menſes* muſt return with it, as uſual; and if in the mean Time the Sucking be continued at the Breaſts, it muſt force a greater Quantity from thence, than it could do before the Veſſels there were overſtretched, and ſo may keep up the Secretion, tho' in leſs Quantity than when the *Epigaſtrick Artery* encouraged it; ſo that now it cannot ſurpriſe any Body to find, that the *Milk* ſhould have different Qualities, from what it had when ſeparated from a greater Plenty of Blood: From all which Conſiderations, it is evident that it is not the Quantity of the Maſs, but the Way and Manner in which it is ſhared, that influences the *Womb*; and that it is not the Loſs of twenty Ounces of Blood once a Month that Nurſes undergo, when they menſtruate, which ſpoils their Milk, and makes them bad Nurſes; but the Alteration of the conſtant Bent and Courſe of the Blood from the Breaſts to the Womb.

44. *Corol.* I. From the Account we have given of the Circumſtances of the *Womb*, it will appear, to how little Purpoſe the particular Conſtitution of Women has been ſo much inſiſted on, from *Hippocrates*'s Time till now, as the Ground of this Flux: I eaſily allow that the Sex, for the moſt Part, have a different Way of living from Men; but what is that to the Purpoſe? How idle is it to compare the two different Conſtitutions to account for a *Phœnomenon*, that ariſeth from a Part, which is proper to the Sex? But what is ſtill more ſupine and inconſiderate is, That the *Partizans* of the *Plethora*, after they have ſpent a Deal of Time in deducing the Grounds of the *Plethora*, from the particular Conſtitution of the Sex, never miſs to adduce *Sanctorius*'s Authority, to ſhew that Men have the ſame *Plethora*, as well as Women.

45. *Cor.* II. From comparing § 24. with § 26. we find a wide Difference in the Cauſe that brings the Womb to its Stand, and that which brings the other Parts of the Body to theirs. In all the Parts of the Body, except the *Womb*, the Blood comes to have a very free Paſſage by

the *Veins*, and has its Force diverted from the excretory *Ducts*, before it gets an Opportunity ſo to diſtend them, as to open a Way for itſelf by them; but at the Womb Nature has ſo diſpoſed the Veſſels, that, before the diſtending Force be deſtroyed, the Blood has made its Way to the Extremity of the Veſſels that open into the Cavity of the Womb, after which it cannot enlarge, except upon the Stopage of theſe Paſſages again, which is the only Thing that can recover the lateral Preſſure of the Liquors at that Part; and thus the ἀκμὴ of the Womb, and that of the other Parts, depending on different Cauſes, it is no Wonder that they ſhould happen at different Times, or that the Eruption of the *Menſes*, which puts a Stop to the Growth of the Womb, ſhould happen before the Sex be fixed otherwiſe in their Growth, which is Fact, as we obſerved in our Introduction; nay, conſidering the Difference of Structure in every other Part, there is ſome Reaſon to think that there ſhould be a wide Difference among them in reſpect of their ἀκμὴ; thus far we know for certain, that the ſeveral

Parts increaſe in very different Proportions at firſt.

46. *Cor.* III. Since the Blood penetrates into the Cavity of the *Womb*, before the Circulation betwixt its *Arteries* and *Veins* is grown ſo free as to fix its Growth, (which is the firſt Thing that makes the other Parts of the Body come to a Stand, § 24.) it is plain, that, if upon any account theſe Veſſels which open into the Womb ſhould recover themſelves, and thereby put a Stop to the Paſſage of the Blood thro' them, without altering the Circumſtances of the Womb any other Way, that by the ſame Means the Blood will recover its lateral Force to ſuch a Degree, as to diſtend the ſame Veſſels again, and penetrate into the Womb as formerly, ſince it was the free Courſe thro' theſe Veſſels, that was the only Cauſe why the lateral Preſſure was rendered ineffectual for that End (§ 26.).

47. *Cor.* IV. The Moment of the Blood at the Womb being made up of its Quantity and Celerity; whatever diminiſhes either of them, for any continued Time, will leſſen that Force on which the Diſtention of the Veſſels, or the

Flux,

Flux, depends, *& vice verſa*; and conſequently, if theſe be different in different Perſons, *cæteris paribus*, then the Time of Eruption muſt be alſo different; which ſhews what Variety this Flux allows of.

48. *Cor.* V. If the Impediment to be overcome, be different in different Perſons, then, *cæteris paribus*, the Eruption will happen ſooner or later in them, according as the Impediment is greater or leſſer, which further brings in View what a Multitude of Caſes may hence enſue.

PROP. V.

49. THE Uterine *Hæmorrhagie*, after taking Place for ſome Time, muſt ſtop at length.

It being from the lateral Preſſure of the Liquors, that the Veſſels are diſtended, which open into the Cavity of the Womb, 'tis plain that the whole Time the Preſſure exerts itſelf, the Veſſels muſt be upon the Stretch, as likewiſe the muſcular *Fibres* that are every where diſperſed amongſt them (§ 6, 7.), eſpecially from the Time that the Blood reaches the

Sinuſes till it break into the Cavity, the greateſt Diſtention being at that Time; but then upon the yielding of the Veſſels, the Blood having no Support upon one Hand, its Influence upon the Veſſels is immediately deſtroy'd, and thereby they have Liberty to recover themſelves from the Conſtraint they were under, and in recovering themſelves muſt contribute to the accelerating the Motion of the Liquors, which by this Means will have an additional Force in paſſing off, above that which brought them to theſe Veſſels; and ſo of Neceſſity the Veſſels muſt turn quite empty at length, and thus fully recover themſelves: Which is the general Cauſe, why all Eruptions of Blood, at Places diſtant from the Heart, ceaſe of themſelves.

50. *Schol.* From the Way we have explained this Diſcharge at the Womb, it is clear, that not only the particular Quantity of Blood at the *Sinuſes*, and Extremities of the Veſſels upon the Eruption, ſupports the Evacuation, but likewiſe the common Maſs, a Share of which is ſtill coming, till the Veſſels and muſcular *Fibres* have entirely recover'd themſelves;

which I reckon was the Opinion of the *Plethoriſts*, notwithſtanding that *De Graaf* objected againſt them, that the Veſſels of the Womb were not able at once to contain the Quantity evacuated (*g*).

51. *Cor.* I. Since the Elaſticity or Tone of the Veſſels and Muſcular *Fibres* is the Cauſe of their recovering themſelves, and of diſcharging the Blood that lies near to the Extremities, or that has nothing to reſtrain it, then, according to the Degree of the Tone, *cæteris paribus*, the Blood will be the ſooner evacuated, and the new Impediment to the ſucceeding Blood take Place the ſooner; hence Women of a ſtronger Conſtitution, and who in Conſequence of that have the ſolid Parts of their Womb firm and active, will have a more ſudden Diſcharge than thoſe of a weaker Conſtitution; but there is no Reaſon to judge they ſhould want this Flux altogether, and Experience tells us, ſo much of the greater Part of that Conſtitution amongſt us; tho' there may be Examples of every Conſtitution that wants it.

(g) De Graaf Cap. ix. de mulier. organ.

52. *Cor.* II. Whatever Cauſe takes off the *Action* of the Liquors from the Sides of the Veſſels, will give them the ſame Opportunity to recover themſelves as the Eruption does; and thus, if upon any Occaſion the Blood that ſupports the Veſſels after they are forced to any Degree of Diſtention (as happens when it has reached the *Sinuſes*) (§ 29.) be not ſeconded, then the Veſſels will recover themſelves by forcing back the Blood to the Place where 'tis ſuppoſed to have no Reſiſtance, and ſo the Flux will be delay'd: Which Caſe takes Place, when Blood is let from an oppoſite Part of the Body, near to the Time of Eruption (*b*): Hence the Caution ariſeth not to take Blood at the Arm in this critical Time, which otherwiſe may be done ſafely; as we have obſerved in our Introduction; for till the critical Time the Veſſels are but little ſtretched, and therefore, tho' the Force of the Blood be ſomewhat diminiſhed upon them, yet they are not apt to reſile, a ſmall Force being able to keep them at the Degree of Diſtention they have: And

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(*b*) Belin: Prop. VI. de miſſ. ſang.

And that it is from Revulſion, and not from diminiſhing the Quantity, that this Evacuation is diſturbed about the critical Time, will be abundantly plain, when we conſider, that, if inſtead of the Arm, we then take the ſame Quantity at the Feet, it will be ſo far from poſtponing, that it will further the Flux; of which Effect there are very natural Reaſons (*i*).

53. But here I muſt further remark, that drawing Blood at the Feet may ſome time prevent or ſtop, the Flux in the *Criſis*, viz. by making the Blood in the Arteries and Veins preſs too much upon the *Emiſſaries* of the Womb, in which Caſe, the only Thing that can procure a Paſſage for it, is drawing Blood at the Arm, and that by making a Revulſion; to this Preſſure upon the *Emiſſaries*, plethorick Bodies are moſt of all ſubject, their Veins being ſtill overloaded with Blood, which inhibits the Progreſs of the arterious Blood: Now, if a Vein be open'd in ſuch Perſons at the Feet, this Force upon the Emiſſaries will be augmented ſtill the more; whence I reckon that the Solution

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(*i*) Belin. Prop. VI. de miſſ. ſang.

lution given to the notable Caſe mentioned by *Riverius* in the 2d *Obſ.* of the firſt *Century*, by the *Montpelier Phyſicians*, was abundantly juſt, and proves that a *Plethora* rather ſtops than procures the *Menſes*. As to Dr. *Friend's* Solution of this Problem from a *Lentor* or *Viſcidity* in the Blood, I cannot ſee how it can be allowed, till it be ſhown, that drawing Blood at the Feet muſt confirm the *Lentor*, while drawing at the Arm diſſolves it: The ſame Theory will ſuggeſt the Reaſon, why thoſe, who are more delicate and ticklish at this critical Juncture, are then obliged to be very nice in their Diet, becauſe whatſoever raiſes their Blood, gives them great Diſturbance, whereas the Evacuation never goes on more regularly than with a mild and ſpare Diet.

PROP. VI.

54. THE *Periods* which the Uterine *Hæmorrhagie* obſerves is a neceſſary Conſequence of the Circumſtances of the *Womb*.

Since this Evacuation does neceſſarily ſtop, (§ 49.) and ſince after it is ſtopped, the Power that procured it ſtill remains, (§ 46.) it muſt therefore ſtop, and flow alternately, or by Periods, as long as the Womb continues in theſe Circumſtances.

55. *Schol.* I. In this Propoſition we have reckoned it ſufficient to ſhew in general, that the *Uterine Hæmorrhagie* muſt be periodical, it being in my Opinion impoſſible to determine *a priori*, or from the Structure of the Parts, either the Moment of the impelling Liquors, or the Degree of Reſiſtance they receive among the *Capillaries* and other Veſſels of the Womb, ſo as from them to ſhew the Diſtance of the *Periods*; but here we are at no great Loſs, that being eaſily known from Obſervation, by which we learn, that in the moſt of Women, the Interval is near the Time of a lunar Month; tho' the Difference of Circumſtances muſt make in ſome a conſiderable Odds. *Vid.* § 47, 48.

56. I ſaid it was impoſſible from the Structure of the Parts, either to determine the Impediment, or the Moment of the Liquors at the Womb; to ſatisfy my Readers in this, I would have the Injections of the curious *Frederick Ruyſch* conſidered, where, by his ſubtile Art, he brings ſuch *Myriads* of Veſſels in our

View, of ſuch Minuteneſs, different Lengths, Angles, and Subdiviſions, that it muſt convince every Beholder, that there can no Account be made of the leſſer Veſſels (*k*), and ſo; tho' it ſhould be allowed, according to the ingenious Dr. *Keil's* Calcul of the larger Veſſels, (in his Eſſay *de Sang. Veloc.*) that there is a certain Proportion betwixt their Trunks and Branches, yet we can no-way allow of it amongſt the leſſer; and there is a very good Reaſon to be given of the Diſparity; the larger Trunks ſerve for nothing but to make an equal Diſtribution of the Maſs to different Parts, whereas the leſſer Trunks and their Branches are modified after a thouſand different Ways to procure different Secretions; every leſſer *Artery* has a different Machine attatched to it, not made by any general Rule of Subdiviſion of Branches, but by particular Laws to produce particular and different Effects; nay, we ſometimes find a manifeſt Proviſion made for theſe particular Effects in the larger Veſſels themſelves, as we conſpicuouſly ſee in the Make of the Spermatick Artery, where the general Rule, which

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(*k*) Fred. Ruyſch Reſponſio ad D. Abram: Vateri P. 22.

which Mr *Keil* has laid down to find the Velocity in the Branches will not hold, the Velocity of the Blood diminiſhing in its Progreſs thro' the Trunk very irregularly; and as far as we can follow the Structure of the leſſer Parts, we find ſtill ſuch an obſervable Variety, ſo that no Method can be propoſed to find out the Action of theſe Parts, but a diſtinct and particular Deſcription of them; and as far as we can follow out this, ſo far we eſtabliſh a certain and an uſeful *Theory*, which we have in a great Meaſure obtain'd in theſe Caſes, where the *Phænomenon* depends upon the Action of the more compounded Parts moſt expoſed to Obſervation. Thus it is, that now we have got right Notions of the moſt Part of theſe Actions that depend upon the Muſcles: For Inſtance, we ſee how all the various Flexures of the Limbs are perform'd; how the Body is kept erect, how the Face plys it ſelf ſo eaſily to different Quarters; and the Eyes are ſo eaſily fix'd upon particular Objects; and how the Air in the Cavity of the Breaſt is dilated and compreſſed ſucceſſively; and the unwearied Heart receives and diſtributes the vital Streams; with a thouſand other Things that guide us ſecurely in the Inveſtigation of the Parts affected, in the Diſorders of the Body; tho' there are twenty Things in the Compoſition of each Muſcle that we are at a Loſs about; the ſame Way it is, we know the compounded Parts of the Eyes and Ears by which the Air and Rays of Light are modified; tho' we cannot dive into the ſubtile Contrivances by which theſe Parts are ſupported; and thus, the ſame Way, I reckon I have illuſtrated what the particular *Phœnomena* of the *Menſes* depend upon.

The Diſpoſition of the *Sinuſes* of the Womb, and their Communication with the Blood-veſſels and Cavity of the *Fundus Uteri*, (which hitherto has not been conſidered in our Comments upon that Head) makes all as intelligble in reſpect of that *Phœnomenon*, as the *Sinuſes* of the *Penis*, conſidered with the Poſition of the Muſcles and Blood-veſſels, make us know the Cauſe of the Erection, Flaccidity, *&c.* of that Member; tho' at neither of thoſe Parts has any yet pretended to determine the Moment of the Blood; nor do I reckon it of much Importance, the *Phœnomena* there being fully explain'd without it: Yet we can go thus far, as to determine that the Moment of the Blood muſt be very ſmall upon thoſe Veſſels on whoſe Dilatation the *Menſes* depend, the Interval being very long betwixt each *Period*, viz. the Time that this Force takes to open the Way into the Cavity of the Womb; and thus we may ſatisfy our ſelves, that it is a bad Method to judge of the Force of the Blood upon particular Veſſels of any Part, from the Force by which it enters that Part, there being no Part of the Body where the Blood enters in greater Quantity and Velocity than at the Womb, as will appear, if we conſider complexly the Number, Largeneſs, and Poſition of the *Arteries* of the Womb; yet it is plain, that none of it reached the *Sinuſes*, till after a great many Years, and when it reaches them, it has but a very inconſiderable Force; as to the Cauſe of which, I reckon, any *Anatomiſt* will eaſily be ſatisfied, when he conſiders the great Number of Branches that go off from the *Arteries* before they reach the *Sinuſes*, which neceſſarily contributes to intercept the Blood before it can come their Length, nay, we ſee, in Nurſes where the *Epigaſtrick Artery* carries off Part of the Blood of the Womb, that the Veins become ſo far Maſters of the arterious Blood, as to allow none of it to reach the *Sinuſes* at all; tho' Nature has taken particular Care that, at certain Times, the whole Blood that enters the Womb ſhall exert its Force upon theſe *Sinuſes*, as will be demonſtrated afterwards, when we ſhew what they were particularly deſign'd for; all which taken together, will demonſtrate to us, by what eaſy Rules in *Hydraulicks*, the Actions of the Body are made to change and ply to accompliſh different Deſigns, as the Exigencies of the Machine require; and I hope ſuch evident Examples as this of the Simplicity Nature uſes in her Management, ſhall be an Argument to give up with the more intricate and obſcure Reaſons that are advanced by ſome in explaining the animal Œconomy, and keep us ſtill a ſearching, till we find the plain and mechanical Reaſons, which a little Pains and Patience will lead us to: But further, it being by Means of the intermediate Series of Veſſels, that ſo little of the large Quantity of Blood that enters the Womb reaches its laſt Veſſels;

it is evident that the Maſs may be much augmented or diminiſhed, and yet theſe laſt Veſſels have no Alteration of their ordinary Force upon them. For theſe intermediate Veſſels will be firſt influenced, and theſe being eaſily diſtended muſt yield to a greater Force; and a ſmall yielding, in ſo many particular Veſſels, will diſpoſe of a conſiderable Addition from the Maſs; and thus we may underſtand how the Force upon the laſt Veſſels of the Womb keeps equal, tho' the Maſs ſhould be at a Time more copiouſly ſupplied than ordinary; and again, ſince Mr. *Keil* has obſerved in his *Aphoriſms*, that the Maſs can never be kept much at under by Evacuations (*Si corporis pondus evacuationibus largioribus diminuatur, ad ſolitum pondus brevi redit, majori pabuli, vel copia, vel retentione, vel humidi aeris attractione*) we muſt allow, that Evacuations will not much diſorder the regular Procedure of the Periods of this Flux, which holds in Fact, as we obſerved in our Introduction; which both confirms our Doctrine; namely, that amidſt all the Changes of the Maſs, this Flux continues of a Piece with itſelf, and alſo the Truth of that *Aphoriſm* of *Keil*, *Si victus* *modus ſit debito major aut minor, tum ingeſta non reſpondent egeſtis; ſive enim plus, ſive minus comedimus, certam ſibi normam in evacuationibus ſervat natura*; tho' 'tis true, theſe Rules are very different, as to different Secretions: For as there are Secretions, like that of the *Menſes*, which the Changes of the Maſs alter but little, ſuch as the inſenſible Perſpiration, (which, according to Mr. *Keil*, is neither alter'd by the Quantity of Drink we take, nor by Purgatives) ſo there are others that generally alter in Proportion to our Drink, as the *Urine*, of which Difference, no better Account, in my Opinion, can be given, than that the *Secretory Ducts* in the one Caſe are more immediately join'd to the large Veſſels that diſtribute the Maſs, than in the other, which *Ruyſch*'s Injections induce us to believe; With theſe he eaſily penetrates into the Cavity of the *Kidneys*, [*Theſ.* III. 39.] but not to any of the different Pores of the Skin, [*Theſ.* X. 4. and *Theſ.* I. 19, 20.] therefore the Acceſs to the Pores of the Skin muſt be very different from that to the *Pelvis* of the *Kidneys*; By which Example we learn, how in different Parts of the Body the ſmaller Veſſels may be differently affected by the Alterations of the Maſs, which is an Obſervation of great Uſe in the Practice of Medicine. From the ſame Obſervations we likewiſe underſtand, how Eruptions of Blood at the *Kidneys*, *Lungs*, *Noſe*, &c. become more or leſs frequent, regular and copious at different Times, according as the Veſſels, where the Eruption is, are more or leſs immediately join'd to their reſpective Trunks. Notwithſtanding this, I own that all the Eruptions of this Kind, which happen in Conſequence of the *Menſes* being ſtopt, keep the ſame Times with the *Menſes*; but then theſe Eruptions do not proceed from the particular Diſpoſition of the Parts at which they are, but from the Shoke that is given to them periodically, as the *Menſes* make their Effort; at which Time the whole Body has a new Force upon it, as we have explained above, and which will be moſt diſcovered at the weaker Parts, wherever they are: I would have it alſo obſerved, that the *Menſtrua* do not always produce Eruptions at other Parts, when they are denied Paſſage at the Womb; but that theſe happen rarely, while we find Tumours on that

Occaſion frequently to ariſe, now in one Place, now in another, without any Evacuation extraordinary: In ſome again we only obſerve uncertain Pains attacking different Parts; all which ſhew a general Diſorder and a ſpreading Force of the Blood, but give no Proof of a *Plethora*; nay, when Eruptions happen, they are ſeldom to that Quantity to which the *Menſes* flow, and therefore cannot be reckoned as ſubſtituted in their Place; but we have been long enough in this Digreſſion.

PROP. VII.

57. IN old People the Solids turn more rigid, and have leſs Action upon the Fluids, than in thoſe of middle Age.

This is what we find to take Place in Fact, in ſo much that in ſome the Rigidity proceeds to that Degree, that what was membranous and fleſhy at firſt, is found afterwards to be cartilaginous and bony; as to the Reaſon of it, Dr. *Boerhaave*, to whom we owe the moſt accurate *Syſtem* we have in Medicine, has deduced it very probably from the perpetual Action of the Fluids upon the Solids, by which

Means many of the ſmaller Veſſels gradually grow together; hence the Veſſels made up of theſe grow ſtiffer, and leſs active (*a*).

PROP. VIII.

58. THE Decreaſe of the Moment of the Blood, and Increaſe of the Reſiſtance of the Solids, is the Cauſe why the Uterine Evacuation is ſuppreſſed in old People.

Since, by the foregoing Propoſition, the Solids in old People are more rigid, and have leſs Action than in others; it follows, that the Reſiſtance to the Fluids in them will be greater, while the Moment of the Fluids is leſs; upon which Account we have a very ſufficient Cauſe, why in Proceſs of Time the Blood ſhould not be able to force its Way to the Emiſſaries of the Womb.

59. *Schol.* It is eaſy to deduce from the whole of our Doctrine, why People that have born Children ſhould have this Evacuation in a greater Quantity, and keep it to a greater Age than Maidens, eſpecially if their Womb has ſuffered any Violence upon Delivery; tho'

(*a*) Boerh. Inſtit. § 467, 415, 413.

tho' there are Inſtances where it has left ſuch very ſoon upon ſome irregular Cauſe, which may take Place in all the Caſes we have been enquiring into; but theſe will never be brought as Objections by any who conſiders, that what we have been advancing, thro' the whole of this Treatiſe, relates only to what happens in the greater Part of People in Health.

60. And thus I reckon, by the foregoing Propoſitions, I have traced the *Foundation* of the *Uterine Flux*; the *Cauſe* why it is ſo long in diſcovering itſelf; in what *Caſes*, and upon what *Account* it is naturally ſuſpended; and what at length *ſtops* it altogether; and at the ſame Time, the Neceſſity of its Periods, their Difference in different Conſtitutions; and all this by eaſy Conſequences from the Structure of the Parts, and ſettled *Phœnomena* of the Womb, without any Regard to a *Plethora*, or ſo much as aſking one *Poſtulatum*: After all which, if it ſhould be demanded what the Deſign of this *Hæmorrhagie* is, I hope my Opinion ſhall not be look'd upon as amuſing, tho' I ſhould maintain, that it never was deſigned

for any Uſe at all; but that it takes Place in Conſequence of theſe *Paſſages*, which are eſtabliſhed at the Womb, by whoſe Means the *Placenta* is ingrafted to the *Mother*, than which nothing is more neceſſary in the whole *Apparatus* for propagating the *Species*.

61. This Anſwer naturally gives Occaſion to another *Queſtion*, *viz.* Why in *Brutes*, where the ſame *Paſſages* are, the ſame *Phœnomena* do not take Place?

In accounting for which it ought to be conſidered, to what different *Laws* the *Brute* and *Human-kind* are ſubjected to in Generation; we are not ſtinted to *Seaſons* for producing our Fruits, therefore the Paſſages are always to be ready and patent; the *Brute*, on the other Hand, have particular *Seaſons* for that Buſineſs; and if ſuch a Diſpoſition then takes Place, it muſt anſwer the Purpoſe, which we have Ground to reckon to be *Fact*; for it is obſervable, at theſe critical Times in the *Brute*, that there is a great Diſcharge of ſerous Liquors from their *Wombs* (*a*), nay frequently of Blood, which is particularly obſervable in the Dog-kind; ſo that then

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(*a*) Bayle. de Flux. Menſtr. p. 7.

then it is certain the *Blood* approaches nearer the Extremities of the Veſſels of the *Womb*, and ſo appears at Hand to ſerve the *Fœtus* upon its Ingraftment, which is all that is neceſſary from our *Theory*; wherefore, that there is a particular Regulation in this Affair for *Brutes*, and that the Diſpoſition depends upon a larger Aperture of the Veſſels, is plain from this, that moſt of the *Brute-kind* are with the greateſt Certainty impregnated a few Days after Delivery, ſuch as Mares and Conies, when theſe Paſſages are the moſt patent. And by the By, that even certain of the Human-kind may be impregnated, which have never had the true and real *Menſtrua*, provided only they have ſerous Liquors; for this ſhows ſufficiently that the Paſſages are open, which is the great Condition requiſite: How far the erect Poſture of Man makes, that the Blood cannot be near the Confines of theſe Veſſels without breaking out, I leave every one to judge for himſelf; it is plain to me that it muſt contribute a great Deal; and theſe Conſiderations ſolve the Difficulty better than any Thing the *Plethoriſts* have advanced, tho' the Objection equally concerns them.

As to the weighty Problems that uſe to be agitated concerning the Qualities of the Matter depoſited, which amuſe, and ſometimes not a little diſtract the Fair, I induſtriouſly leave them for Entertainment to Nurſes, and to the grave Speculation of that Set of People, who in all Things were too ſuperſtitious; while we look on the whole Contrivance as noble, and altogether indiſpenſible in the Animal Œconomy.

CHAP. III.

Of the Increaſe of the Ovum *and Diſtention of the Womb after their Ingraftment.*

62. IN the fourth *Scholium* to the fourth Propoſition we obſerved, that upon the Blood's entering and filling the *Sinuſes*, the Circulation betwixt the Arteries and Veins was conſiderably ſtopt, and that this occaſions many troubleſome Symptoms, which of Neceſſity continue till the Blood gets Vent into the Cavity

of the Womb: Now this Relief cannot be had for a long Time after the Womb is impregnated, the *Paſſages* from the *Sinuſes* to the *Cavity* being ſhut up by the Ingraftment of the *Ovum* upon them (§ 22.), and therefore, upon that Emergency, the Symptoms will continue till the Way betwixt the *Sinuſes* and *Placenta* is ſo free, that the Blood, which uſes to return by the Veins of the Womb, can freely paſs this Way to the *Fœtus*, which is the firſt Relief it can have, ſince, after Pregnancy, the *Sinuſes* are always more and more diſtended, and conſequently the Communication betwixt the Arteries and Veins, always more and more ſtopt, which lets us ſee how admirably the *Sinuſes* have been contrived for the Uſe of the *Fœtus*, it being by their Means that the Blood, which before Conception circulated idly thro' the Womb, is now determined to the *Placenta* and *Fœtus*, and that more and more, the longer the *Fœtus* has been in the Womb; ſo that in a great many Women the whole Blood comes at length to paſs by the *Fœtus*, which formerly paſſed by the Veins, at leaſt ſo far, as to prevent the bad Symptoms, which aroſe from the firſt and ſudden ſtraitning of the Paſſage by the Veins.

63. This Obſervation gives us a clear Idea of the new Force, which makes the Womb to diſtend ſo remarkably upon Impregnation; and if we add to this ſome other Obſervations, that relate to the Diſtention of the Womb, we ſhall be enabled plainly and eaſily to conceive the whole Procedure of this Affair, which hitherto has been ſo myſterious.

Upon Pregnancy, after the Blood has reached the *Sinuſes* in its ordinary Courſe, without being allowed to paſs to the Cavity of the Womb, it muſt diſtend them more than ever was done before, and ſo compreſs the Veſſels more that ly among them; hence the Blood that enters by the *Hipogaſtrick* and *Spermatick Arteries*, which is very conſiderable, will be much impeded in its direct Courſe along the Veſſels, and be made to exert the moſt of its Force upon the Sides of the *Arteries* and *Sinuſes*, to which it has an eaſy Acceſs, but difficult Exit; and theſe being every where ſcattered thro' the Womb, every Part of the Womb will have a Share of this new Force upon it: And conſequently every Part of the Womb muſt diſtend more or leſs in Proportion to its *Strength*; and the outer and vertical Part of the *Fundus* which is remarkably weaker than the other Parts (§ 5.), will yield the moſt; and the more it diſtends, it ſtill turning the weaker, (tho' it may perhaps appear of an equal Thickneſs from the diſtended Veſſels being kept full) the Proportion by which it diſtends more than the other Parts will ſtill increaſe; which is a juſt Account of what *Deventer* and *Ruyſch* obſerve, *viz.* that the ſmall Part of the Womb betwixt the *Tubæ* on the upper Side, increaſes much more than all that is below them (*a*), in the Time of Pregnancy.

64. It is not ſo eaſy to find by what Proportions the inner Side of the *Fundus* diſtends, tho', I hope, to make it out by a careful collating of Obſervations.

We obſerved formerly, that the whole *Ovum*, except the Part that lies over the Entry to the *Cervix*, was join'd with the whole inner Side of the *Fundus*; and that this Part was the Rudiments

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(*a*) Devent. ars obſtetr. Cap. vii. Fig. 4. Ruyſch Theſ. vii. p. 8.

ments of the *Placenta*, while that which lay over the Entry to the *Cervix* became the *Chorion* and *Amnion* (§ 21, 22.); this being the firſt Condition of the *Ovum* in reſpect to the *Fundus*, the Queſtion ariſeth, How, after the Womb has come to its utmoſt Stretch, the *Placenta* ſhould be found only ſurrounding the vertical Part of the Womb's Capacity, which is poſſeſſed by *Ruyſch's* Muſcle (§ 7)? To which I anſwer.

65. 1*ſt*, That the *Ovum* incloſed in the Cavity of the *Fundus*, will upon all Sides be urged with the ſame Force with which the *Sinuſes* and *Arteries* are (§ 63.), ſince it is contiguous to them; and being thus ſqueezed, it muſt be forced towards the vertical Part which then is yielding (§ 63.), and carry up with it the inner Side of the *Fundus* to which it is attached, while all the outer Parts below the *Tubæ* are kept firm in their Place by the neighbouring Parts to which they are joined, as are likewiſe the outer Parts of the *Cervix*, which will make them likewiſe immoveable, tho' its Innerſide, contiguous to the Inner-part of the *Fundus*, and which is very looſe (§ 8.) will allow to be drawn up with the *Ovum*; ſo that we find,

upon the yielding of the outer vertical Part of the Womb to the increaſed Force of the Blood, the *Ovum* is determined to follow it, and draw along with it the Inner-ſide of the *Fundus* and *Cervix*; and that in Fact it is ſo, is evident from this, that, after Pregnancy, the *Os Internum Uteri* recedes from the *Os Externum*, while the outer Parts, to which the *Cervix* is joined, do not alter (*b*); and again, while the external Parts of the *Tubæ* are carried a good Way from the *Vertex* (§ 63.) their Mouths open ſtill into the vertical Part of the *Fundus*, or the Middle of the *Placenta* (§ 12.) as *Fallopius* obſerves (*Obſerv. Anat.*); which is a certain Argument, that the Inner-ſide of the *Fundus* does not diſtend in Conjunction with the Outer, but in the Way we have ſhown.

66. 2*dly*, Now, the vertical Part of the *Fundus* yielding, and the *Ovum* following it, that Part of the *Ovum* next the *Cervix* muſt recede ſo far from the ſtrong Sides of the *Cervix*, which meeting here, did ſupport it on that Hand (*c*), and conſequently will be altogether defence-

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(*b*) Ruyſch. Catalog. rarior. P. 118, 119. (*c*) De Graaf de Mulier. Organ. Tab. IX, X.

defenceleſs, while the other Parts of the *Ovum* are much ſtrengthned, by being kept cloſe in Contact with the Sides of the *Fundus*; wherefore the contain'd Fluid, which is urged on every Side, except this, will ſhew its Force principally on this Part, *viz.* it will ſtill ſtretch this Part of the *Ovum*, ſo as to keep it contiguous to the meeting Sides of the *Cervix*, while the other Parts follow the yielding Part of the *Fundus*, and thus, this Part of the *Ovum* muſt ſtretch in Proportion to the ſtretching of the outer vertical Part of the *Fundus*: In the mean Time, the Blood from the Womb immediately entering that Part of the *Ovum* which is joined to it, will have a conſiderable Force upon it, and make its Veſſels inlarge, as the Quantity of Blood paſſing to the *Fœtus* increaſes; which accounts for the Thickneſs of the *Placenta*, at the ſame Time that we ſee it is much confined from ſpreading to any great Breadth as the other Part does; ſo that of Neceſſity it is little, thick and vaſcular, while the other Part, which was very inconſiderable at firſt, inlarges itſelf much, and keeps membranous, the Force of the Blood being very ſmall in its Veſſels, and the Force of the Fluid ſurrounding the *Fœtus*, very ſtrong upon it.

67. And thus we have diſcovered by what Contrivance it is, that any Part of the *Ovum* indifferently can be *Placenta*, and any Part of it *Chorion* and *Amnion*, as we obſerved to be Fact (§ 21.), and which is ſtill more confirmed by a common and familiar Obſervation, *viz.* that we ſeldom find in two *Placentas* the umbilical Cord inſert into the ſame Part, now it is at the Center, now at the Circumference, and in others at different Parts of the *Area* (*d*), which is a plain Demonſtration, that it is uncertain how that Part of the *Ovum* fixes, where the umbilical Veſſels are inſert, and conſequently the Poſition of all the Parts of the *Ovum* in the *Fundus* muſt be uncertain, which confirms our former Reaſoning (§ 17.).

68. Since the *Ovum* at firſt takes up the whole Bounds of the *Fundus*, and inoſculates thorowly with its Sides, then, if there are two or more *Ova* impregnated at once, they will be confined to the ſame Bounds, and of Neceſſity muſt be con-

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(*d*) Ruyſch. Obſerv. Anat. XCVII. Catalog. rarior. Repoſit. 3. N°. 11. Theſ. VIII. P. 14.

contiguous one to another, which ſhews the Reaſon why the different *Placentas*, when there are more than one Child at a Birth, are always united together, according to *Deventer's* Obſervation (*e*); and in theſe Caſes where more than one *Ovum* is impregnated, it is evident, if, after their Ingraftment, one of them ſhould drop off, that then the *Menſtrua* will take Place; but otherwiſe in a Woman with Child the *Menſtrua* can never take Place, except, that by ſome Chance, or irregular Make of the Womb, the *Ovum* ſhould miſs ſome of the Paſſages that open into the *Fundus*.

69. By this Time, I reckon the Conſiſtency and Simplicity of our Scheme will appear; and whoever reflects maturely upon it, cannot be at a Loſs to find out the Deſign of the whole Contrivance, as we have explained it; one particular Cavity being fitted for the *Ovum* makes its Ingraftment certain; and if after the Ingraftment the whole *Ovum* and *Fundus* had diſtended regularly one with another, the whole Invelopment of the *Fœtus* would have been

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(*e*) Devent. ars obſtetr. Cap. XII.

been *Placenta*, its Veſſels been ſpread thro' a great Bounds, and its Separation at length been attended with great Difficulty; whereas by the Method that takes Place, we ſee that the whole Blood which enters the Womb, whether at the *Vagina*, *Cervix* or *Fundus* (§ 10.), has Acceſs to the *Ovum*, and is brought within a ſmall Compaſs, and ſo muſt arrive at the umbilical Vein, and thence to the Liver, with a juſt Force and Warmth.

70. It is very obſervable what *De Graaf* takes notice of amidſt all the Changes of the Womb, *viz.* that the *Collum* or *Cervix* ſcarce undergoes any Change at all, while the *Fundus* increaſes at ſuch a Rate (*f*); ſo that it is certain that no Part of the *Fœtus* enters the *Cervix* till the Time of Delivery approaches; by which Abortion is very much prevented, the *Fœtus* by that Means being kept at a great Diſtance from the *Vagina*; but when the *Fœtus* has come to that Bulk with its Fluid, that it takes up all the Bounds of the *Abdomen*, and has incroached much on the *Midriff*, and brought

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(*f*) De Graaf de mulier. organ. P. 95.

all the Parts about to ſuch a Diſtention, that it requires a greater Force to diſtend them further than what is requiſite to dilate at once the Cavity of the *Cervix*, then the *Cervix* hitherto ſecure, is made to yield; which it can do now with more Eaſe than at firſt, becauſe that all its Parts are larger from the Increaſe of its *Sinuſes*, tho' this Increaſe is noways conſiderable, and hitherto ſerved rather to ſhut than inlarge its Cavity, ſince the more the Sides of the *Cervix* are inlarged, the nearer they meet, and ſo ſecure more and more the Paſſage of the *Ovum*, and afterwards of the *Fœtus* from the *Vagina*; but when Matters come to that Paſs, that the inlarging *Fœtus* gets not Room to diſpoſe of itſelf in the *Abdomen*, and the *Midriff* bears cloſs upon it, then the whole Force lands upon the *Cervix*, and preſſes it open, till its Cavity yields, and thereby ſuddenly inlarges the Bounds of the *Fœtus*, which hitherto was confined to a certain Poſture, it being kept always compact in its Seat, but when the Space about it ſuddenly inlarges, and there is a ſudden Run of the Fluid to the widening Space, the weighty Head falls forward the ſame Way, and wedges itſelf into the *Cervix*; at which Time, Women very ſenſibly find the Upper-part of their Belly turn leſs, and take it for a good Sign of a regular Birth; in the mean Time the Bulk being ſo much increaſed in the lower and ſtraiter Part of the *Pelvis*, the laſt Gut upon the one Hand, and the Bladder upon the other, is much compreſſed and irritated; hence a *Teneſmus* and *Strangury*, and a great Diſorder thro' all the neighbouring Parts connected with them, which increaſes to ſuch a Pitch, that all begin now to be convulſed around; the Muſcles of the *Abdomen* and *Diaphragm* exert their utmoſt Force, which never miſs to be affected together with the *Inteſtines*, and with no ſmall Hubub and Alarm bring upon the Theater, one of the Lords of the Earth.

71. And thus we find from the Deſcription I have given of the *Womb*, and the Obſervations relating to it, ſuch an Agreement as makes up an uniform and coherent *Syſtem*, which takes in more Particulars than ever came within the Verge of any *Theory* before upon the Subject. In maintaining of which, I ask no more Favour, than

the getting a thorow Hearing, to have the *Facts* examined, and the *Concluſions* freely criticiſed; it being my Opinion, that no Sentiments can be too much tried; and that nothing at preſent is a greater Scandal to the Profeſſion, than the Truſt that is given to Authors; the Bulk of us, like School-boys, dote upon great Names, and bring the Characters of Perſons into our Arguments; whereas there are few Debates in our Buſineſs, whereof every one that is diligent, may not become a competent Judge.

72. I had perſuaded my ſelf that Phyſicians of this Age, who had ſeen the Performances of the greateſt Genius's ſucceſsfully called in Queſtion, even the Deſcriptions of *Anatomiſts*, without Regard to the *Autopſia* which they plead, ſhould not have been much ſtartled to find any Manner of Writings criticiſed: Lord *Verulam* ſays, *Nemo reperitur, qui in rebus ipſis, & experientia moram fecerit legitimam*; and again, *Nonnulli qui experientiæ undis ſe commiſere, & fere mechanici facti ſunt, tamen ipſa experientiâ erraticam quandam inquiſitionem exercent* (g): There

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(g) Verulam præfat. ad novum organ.

are very few Experiments but what allow of reviſing; and the Reviſer acts a noble Part when he does it out of Love to Truth; which he can do, and, in the mean Time, ſhew all Regard to the *Subject* and *Author:* For my Part, however free I have been with *Sanctorius*'s *Aphoriſms*, I ſtill retain the greateſt Veneration for him, and reckon his *Invention* of ſuch Importance to Medicine, that his Name deſervedly is inroll'd amongſt the Worthies of the *Æſculapian* Family; but ſhall we loſe the Advantage of the Invention by blindly ſubſcribing all he aſſerted about it? In my Opinion we do him the greater Honour to cut off from his Works, what would make After-ages be offended at them; at leaſt we muſt be allowed to be greater Friends to our common Profeſſion, which muſt ſuffer by every wrong Sentiment.

73. Since my firſt venting, what I wrote in my Introduction, I find ſome not a little chagrin'd upon my calling in Queſtion *Sanctorius*'s Authority concerning the monthly Accumulation; what Temptation, ſay they, had the Man to ly? How could ever ſuch a Thing have come in his Head without ſeeing of it? I

don't pretend to give the Riſe of all the unaccountable Opinions of *Authors*, tho' I don't reckon my Conjecture improbable I made upon this Head in my Introduction; and I think it as reaſonable a Queſtion for me to aſk, how Dr. *De Groter* the *Dutch* Experimentator ſhould have miſt obſerving ſuch a remarkable *Phœnomenon?* And if it be not more reaſonable to truſt *Keil's* Tables, where the Experiments themſelves are ſet before our Eyes, than *Sanctorius*, who gives us no formal Experiment at all, but only a Medley of Opinions, ſome of them built upon *Experiments*, others upon *Fancy?* Nay, I reckon the monthly *Accumulation* very inconſiſtent with *Sanctorius's* other Aphoriſms; for Example, he makes a Change of *Air*, in one Day's Time, ſtop a third Part of the uſual Perſpiration, *Sect.* 2. *Aphor.* 9. a bad *Digeſtion*, in one Night, near one half; different *Meats* now to increaſe it, now to decreaſe it, by a fourth or third Part, *Sect.* 3. *Aph.* 1, 8, 24, 25, 69, *&c.* Nay, *De Groter*, finds, from *Sanctorius*, Thirty two different *Cauſes*, to which we are expoſed every Day, that diminiſh the Perſpiration after the ſame Manner; beſides which there are a great many other Cauſes that affect it otherwiſe; and at the ſame Time the other Secretions of the Body are much given to Changes; conſidering which it is impoſſible to conceive how there ſhould be any equal or certain Accumulation; or that Matters ſhould be any otherwiſe than as *Keil*'s Tables repreſent them; by theſe we find, as we obſerved in our Introduction, that the Body is in a moſt uncertain State as to its Weight, one Day being one Pound heavier, and the next Day two Pounds lighter, and ſo on without any Rule, tho' moſt agreeable to the Circumſtances of the Body.

74. But in caſe there be ſomething reckon'd ſtill doubtful in my arguing here, I muſt bring under Conſideration ſome other of his *Aphoriſms*, that ſeem more directly to contradict that One of the monthly *Plethora*. *Æſtate temperata corpora ſunt minoris ponderis quam hyeme tribus libris circiter*. Sect. 2. Aphor. 23. *Ab æquinoctio autumnali ad ſolſtitium hyemale qualibet die minus libra circiter perſpiramus, inde uſque ad æquinoctium vernale incipimus liberius perſpirare*, Ibid. Aph. 41. When we take the Conſideration of theſe two Aphoriſms together, we muſt allow, ac-

cording to *Sanctorius*, that tho' the other *Evacuations*, by being enlarged, compenſate ſomewhat a diminiſh'd *Perſpiration*, yet they do it not to that *Degree*, but that it contributes to ſupport the *Weight* of the Body; thus we find that by the Perſpiration being leſſen'd from the *Autumnal Equinox* to the Winter *Solſtice* (*Aph.* 41.), that the Body increaſes Three Pounds in its Weight (*Aph.* 23.), which is a Pound more than what *Sanctorius* makes preceed the monthly *Criſis*. Pray, now, how is this quarterly Increaſe, towards the Winter, and Decreaſe, towards the Summer, conſiſtent with a monthly Increaſe, and the Body's Return again to the ſame Weight?

Whether or not again, from *Sect.* 1. *Aph.* 10. is it manifeſt, that none can have the monthly *Criſis* after the Manner *Sanctorius* aſſerted, *Sect.* 1. *Aph.* 65. without falling under a bad *Habit*. But I have been long enough in ſhewing that *Sanctorius*'s *Aphoriſms* allow very well to be criticiſed, and particularly that one, which is the great Support of the modern *Hypotheſis* of the Cauſe of the menſtrual *Flux*.

75. I had deſigned to have concluded this Treatiſe, with ſome Obſervations for the Inveſtigation of the *Diſeaſes* of the Womb and their *Cure*; but finding that the very mentioning of a new *Theory* of the *Menſes*, after it ſeem'd to be ſo ſatisfyingly adjuſted, was look'd upon as an idle Amuſement; and ſo preſaged a very bad Reception of it; I perſuaded my ſelf to ſtop here for ſome Time, till I ſhould learn ſomething of its Fate; and therefore, I ſhall only make this general Obſervation upon the Head, that whatever was advanced upon good Grounds, in explaining the Irregularities of the *Menſes*, and for accompliſhing their *Cure* by the *Plethoriſts*, may the ſame Way be deduced from our Doctrine, having ſhown that all the *Phænomena* of the *Menſes* on our Suppoſition were much the ſame as if produced from a *Plethora* (*b*), tho' there be a great Difference betwixt the *Plethoriſts* and us in this, that they aſſert an Augmentation of the Maſs which we deny; and conſider nothing of the unequal Diſtribution of the Maſs, which we make the Foundation

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(*b*) Vid. Sect. 37, 38.

on of all the Symptoms that happen, and produces a real *Plethora* in certain Veſſels, tho' not in the Maſs; to carry off which we can have no other Indication than to get the *Emiſſaries* of the Womb made patent, which is the only Means, by which the *Plethoriſts* pretend to diminiſh the Maſs in theſe Caſes; and ſo at whatever Diſtance I have hitherto kept from the *Plethoriſts*, I now moſt willingly join them; tho', it muſt be allowed, that from the particular Account I have given of the *Womb* and its *Alliances*, there can be form'd a more particular Hiſtory than from the bare Hypotheſis of a *Plethora*; which Hiſtory at the ſame Time muſt contribute a great Deal to the Underſtanding of the *Symptoms*, and their *Cure* that happen upon Conception, Gravidation, at the Time of Delivery, and in Child-bed.

AP-

APPENDIX.

IT is not a little ſurpriſing, how, ſince *Harvey's* Invention, and other modern Diſcoveries, by which it is found out that the whole Body is but one Concatenation of Veſſels, more or leſs, immediately join'd to the *Aorta*, that there has been ſo little Pains taken to ſhew the Conſequences, of the *Proportion* of theſe Veſſels being changed, from the Laws of *Hydraulicks*, which ſeems to be the firſt and moſt natural Attempt that one, acquainted with the human Machine, ſhould make: The ingenious Dr. *Lower* made a glorious Second to the great *Harvey* in this, and one wou'd have reckon'd that his obſervable

Succeſs ſhould have engaged a great Deal more in the Method; but it has fallen out otherwiſe, we finding very little done this Way ſince his Time: It is owing to this Neglect, in my Opinion, that our Moderns have attached themſelves ſo much to that intricate Affair of knowing the Deviations of the different Liquors of the Body, and accounting from them, in a very arbitrary Way, for its *Diſeaſes* and their *Cure*, by which they have engaged themſelves in an infinite Work to very little Purpoſe: I muſt own my Dulneſs to be ſo great as hitherto not to have been able to find out any Thing certain in the Performances of that Kind, and have brought my ſelf to believe that the moſt Part of the *Symptoms* that are ordinarily attributed to the *Humours*, may be accounted for from the Changes that happen among the Solids: I gave a great many Examples of this in my former Diſſertations; and I perſuade my ſelf, the Account I have given of the Womb, where I have not conſidered the Qualities of the Liquors at all, ſhall ſuggeſt a great deal more: My Attempt was certainly very bold to explain the whole Effects of the Cold upon theſe Principles;

ciples; but the more I obſerve about them, I am ſtill the more perſuaded, that what I advanced upon the Head was juſt; and that I may ſatisfy others about it, as much as I can, I ſhall beg leave to make a further Repreſentation of that Affair.

Of the Cold.

§ 1. AFTER *Sanctorius* found out that the inſenſible *Perſpiration* was not ſo plentiful in *cold* as *warm* Weather, *Phyſicians* inſenſibly came into the Opinion that *Coughs*, *Diſtillations*, *Stitches*, &c. which happen upon ſome Part of the Body, being unwarily expoſed to the *Cold*, was owing immediately to the Perſpiration being diminiſhed; tho' *Sanctorius* himſelf had obſerved the Perſpiration conſiderably diminiſhed from that Cauſe, without any ſuch Effect, [§ 2. *Aph.* 9.] and no where elſe attributes them to ſuch a Cauſe: As for Dr. *Keil* he argues very much againſt it, and ſhews it to be a very inconſiſtent Hypotheſis (*a*); nay he ſhews, in two Inſtances, where a *Cough* was

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(*a*) Diſquiſ. prima ad med. ſtatic.

was produced by *Cold*, that in Fact the *Perſpiration* was not diminiſhed (*b*); and again, that one Half of the Night's *Perſpiration* was retain'd without Harm (*c*); and therefore reckons, that of Neceſſity a *Cough* muſt proceed in theſe Caſes from the *Qualities* of the *Air* that penetrates our Body, as *Sanctorius* ſeems likewiſe to do (*d*); Dr. *Keil* indeed reckons it to be done by ſome *Virtue* of a Piece with that which turns Liquors into *Ice*, *Sanctorius* by a *Virtue* that turns the *Perſpiration* into *Ichor*, tho' none of them ſhews, ſuppoſing their Hypotheſis to be true, how the Effects ſhould follow, nor can it be eaſily fathomed.

2. In what I have now to add, I ſhall propoſe ſome Objections againſt Dr. *Keil*'s Opinion of the coagulating *Power*, or any other *Malignity* of the Air, being concerned in theſe *Effects* we ordinarily attribute to the *Cold*; and then ſome further Conſiderations to confirm the Opinion I formerly gave of the Way the Body was affected by the *Cold*.

3. Beſides the Arguments I advanced againſt the *Malignity* of the Air, as a Cauſe of theſe Effects

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(*b*) Aph. 34. (*c*) Aph. 32. (*d*) Sect. 2. Aph. 6.

fects we ordinarily attribute to the *Cold* (*e*), I muſt aſk why the ſame malign *Quality*, that muſt neceſſarily mix itſelf with our *Food*, does not with it promiſcuouſly reach every Part of the Body? Or ſince all Manner of Humidity produces theſe Effects equally, when applied to the Body; how came it, that in the Caſe where Dr. *Keil* obſerved eighteen Ounces of *Humidity* to be drawn into the Body, in one Night's Time, from the Air, that none of the Symptoms of the *Cold* were obſerved? Or how comes it that in the Uſe of the warm Bath, of which a great Deal is drawn up into our Body, never any ſuch Thing happens; tho' a Colar dipt in the ſame Water and kept *cold* about the Neck affects it? If it be ſaid, that the *Warmneſs* of the Liquor in the one Caſe prevents it; then I would argue, that the *Malignity* ſhould never ſhew its Effects deeper than the Mouths of the *Abſorbents*, becauſe it cannot paſs them without being warmed, and ſo ſhould never affect the *Glands*, or any other Part beyond the *Skin*; But beſides, ſince all the *Abſorbents* are allowed to communicate with the *Veins*, it is evi-

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(*e*) Diſſer. 3. from § 47. to 52.

evident that the *Malignity* would firſt ſhew its Effects there, and thence would be carried to the Heart; ſo that, at this Rate, the *Arteries* or *Glands* that are appended to them, could never be affected by the *Malignity*, but as it came from the *Heart*; and therefore all the *Arteries* and *Glands*, moſt diſtant from the Place where the *Cold* was applied, would be promiſcuouſly affected, which is contrary to Fact.

4. If a like Difficulty ſhould be propoſed to me to ſolve, *viz.* why, in going to waſh in Sea, River Water, or the cold Bath, where there is both *Cold* and *Humidity*, the Effects of the *Cold* are not produced as in the other Caſes; I muſt deſire the Difference of Circumſtances to be conſidered. In the Caſe that we put, there is but one *Place* of the Body affected, ſo that its Influence upon the Maſs of Blood is inconſiderable; in the Caſe of Bathing, the whole muſcular *Syſtem* is at once affected, and hence the Force of the Blood is conſiderably augmented thro' every Part of the Body; ſo that, tho' upon our firſt going into the Bath, we feel the Effects of the *Cold*; we ſhake, ſhiver, and paſs Urine; yet immediately after, the Muſcles

and muſcular Fibres of the Veſſels agitate the Blood ſo, that its Force is obſerved at the moſt ſuperficial Veſſels of the Body, tho' oppoſed by the cold *Medium* that ſurrounds them; they are kept in the full Diſtention, and the Blood circulates thro' them in due Proportion; hence, on a Sudden, the whole outer Superficies of the Body glows with Warmth, and turns red like a Lobſter: Yet if we ſtay in the cold *Bath* beyond Meaſure, we ſhall find the *Muſcles* languiſh and turn weary, by being kept too long on the Bend, and then it is the *cold* Water begins to produce theſe Effects, which it does for ordinary, when applied to the Body ſo as not to augment the Force of the Blood equally in every Part of it.

5. I muſt further aſk thoſe, who alledge the Attraction of *malign Vapours*, as what produce the Effects of the *Cold*, whether or not the Face, Breaſts, and Limbs, that in ſome are much expoſed, attract as the other Parts do? And if they attract, why we don't perpetually ſee the Effects of that Malignity? The Difficulty is eaſy anſwer'd upon my Hypotheſis, ſince we find that the *Proportions* of the *Solids* in any

Part of the Body can be changed gradually without any *Harm*, but not on a Sudden. Thus in the preceeding Treatiſe we found, that the *Womb* gradually enlarges to a vaſt Bulk, and the ſame Way upon *Delivery* contracts again; but if a *Surpriſe*, or any violent *Paſſion*, or ſudden Touch of *Cold* ſhould come upon a Perſon immediately after Delivery, and thereby the *Muſcles* of the Womb, that were gradually contracting, made at once, to reduce themſelves, and ſo ſtop the *Lochia*; in this Caſe the Blood is made ſo precipitantly to diſtribute itſelf, that not unfrequently the neighbouring Parts, eſpecially the *Epigaſtrick* Region, are inflamed, a Fever and Delirium produced; whereas, if the *Womb* had been allowed gradually to contract itſelf, and in the ſame *Proportion* the Blood, that formerly had paſſed to the *Fœtus*, been allowed to enlarge the neighbouring Veſſels to the Womb, in a few Days it would have provided a *Retreat* for itſelf, without any Inconvenience. It is the ſame Way, by which the Proportions of the Veſſels that are expoſed to the Cold do alter; if any Part be gradually expoſed to it, there the outer Veſſels contract and turn ſtronger, and by the ſame Steps their neighbouring Veſſels turn ſomewhat wider, and allow a greater Quantity of Blood to paſs them than in another Caſe; and this they do, when expoſed to a Degree of Cold, which, if applied to another Part of the Body, where the natural *Proportions* of the outer and inner Veſſels had not been alter'd, would have produced all the Effects, which a ſudden Flood does, when ſent in upon any of the Veſſels of the Body.

6. But further, I would aſk what ſupports a *Cough* in a Perſon for ſome Months and Years together, tho' after the firſt Attack he is carefully guarded againſt a ſecond? Does not this argue a Loſs of the *Tone* in theſe Veſſels that received the Force of the Blood that was beat from the Place where the *Cold* was applied? And don't we ſee theſe *Symptoms* carried off by Bliſtering, Blooding, Cupping, even without Scarrification, nay, frequently by a Piece of Woollen-Cloath kept upon the Part affected, and other ſuch Methods of Revulſion, where we can ſuſpect no ſpecifick Diſſolvant, if applied before the oppreſſed Part has loſt its *Tone*, which makes it incapable to recover itſelf.

7. It is to be obſerved, to form a better Notion of our Doctrine, That the Parts of the Body are the eaſier affected by the *Cold*, the more complicated the Veſſels are at them : Thus the glandular Parts are eaſier affected than the reſt: And according to our Hypotheſis the Reaſon is obvious ; in Parts where the Veſſels are leſs complicated, they yield eaſier to the urging *Force*, and ſo allow the Blood to paſs in a greater Quantity without Difficulty: And to confirm this Account of it, it will not be amiſs to obſerve, that if a *Tumour* ſhould happen at any Part of the Body whatſoever, and thereby the Bounds about be ſtraitned, and made leſs capable to receive a greater Quantity of Blood, that then the Cold will influence it eaſier than it does the Glands themſelves, ſuppoſe the *Tumour* be in Parts that otherwiſe are very inſenſible of the Cold; thus we find all *Tumours* in the Arms and Legs, as in the other Parts of the Body, to enlarge much by being expoſed to the *Cold*; and the Glands are ſtill more eaſily affected when ſwell'd, than otherwiſe : Now ſince all the Variations that are obſerved upon the different Circumſtances,

in which the *Cold* is applied, are ſo eaſily accounted for from our *Scheme*, with ſuch Evidence and Simplicity, Why ſhall we contrive obſcure and unintelligible Cauſes to explain the Effects of the Cold by, from whence we can take no Indications of Cure, while the other Accounts for the moſt ſucceſsful and eſtabliſhed Practice? This conſtringing Force, we have all along attributed to the Cold, is as manifeſt as any Thing can be that is expoſed to the Eyes; no ſooner we riſe from the Fire, with our Veins turgid and ſwell'd, and go into the open Air, but they collapſe and ſhrink; Perſons troubled with ſwell'd and knotty *Veins* find a great Change upon them in Summer and Winter, in hot and cold Weather; the lax and white *Swellings* about the Joints can ſcarce be ſafely treated, but by pumping cold Water upon them; I have ſeen a Nurſe's Breaſts, tho' lately ſuckt, run out in paſſing betwixt the Fire and Bed, after having caſt herſelf looſe, and ſo expoſed her Breaſts, which uſed to be covered; I have known likewiſe Women menſtruate upon going in to the cold Bath, which is a very extraordinary Effect of it; but it is to be obſerved, that that they who were ſo affected by it, menſtruated frequently in the Space of a Month, which to me was a plain Indication that the Veſſels of the Womb were very lax; it being certain that the cold *Bath*, uſed at the critical Time, does ſtop that Flux, for the very ſame Reaſon that *Surpriſes* of any Kind do it; the muſcular Fibres of the Womb (which at that Time are ſtretched beyond their ordinary Tone) with the other muſcular Parts of the Body, are made ſuddenly to contract by ſuch Cauſes, and the Contraction at the Womb neceſſarily ſtops the Flux; it is very much otherwiſe when the Womb is weak and lax, for in that Caſe it is paſſive, and gives Admittance to the Blood, which every other where is ſtrongly agitated: And thus we ſee how the Cold at different Times may produce very different Effects.

8. I went the Length, in accounting for the Effects of the Cold, likewiſe to account for the Rheumatick Blood, which is ſo familiar to People with Coughs, Stitches, Tumours, or who upon any other Account have the Blood retarded, at whatever Part of the Body

it is; as I explained at large from Paragraph 37 to the 46, in the Treatiſe upon the Cold: I ſhall now confirm the ſame by three Examples; *Firſt*, In a Gentleman who, perfectly well, ſtreſſed his Back by miſſing a Stroke at Golf. In a *Second*, who got much ſuch another Streſs upon miſſing a Step of a Stair; and then in a young Lady, who got a Streſs at the Part where the Middle of the *Muſculus Cucularis* lies upon the Right Side, in catching at a greater Weight than what ſhe was able to ſupport. In all theſe Caſes, the Pain and Stitches continued for ſome Time, and were always eaſed by Blooding; nor was the Blood leſs *Rheumatick* than in a Pleuriſy, tho' there could be no Suſpicion of any accquired *Malignity*; the plain Account of the Miſchief in theſe Caſes is, that the Muſcles are contracted with ſuch a Violence to ſupport the tottering Body, or ſuperior Weight that the Blood-veſſels among them are ſtrongly ſqueezed, and their Blood hurried upon the ſerous Veſſels, which thereby loſe their Tone, and ſo continue inflam'd till the Tone be recovered again; and it is the ſlow Motion that the Blood has among the ſerous Veſſels, or the Veſſels they compreſs, when dilated themſelves, that occaſions its acquiring the Rheumatick Appearance; ſo that Inflamations may have their Seat in the dilated ſerous Veſſels without coagulated Matter, as frequently happens in the *Tunica Cornea* and *Adnata Oculorum*, which naturally have no Blood-veſſels, and yet by tying one's Colar too ſtrait, they at once inflame: So that we ſee, whatever forces the Blood upon the ſerous Veſſels inflames them; and the Way we treat theſe Caſes with Succeſs, argues much that there is no other Thing in the Caſe but a preternatural Diſtention of the Veſſels; we uſe Evacuations for Revulſion, and apply topically ſtimulating and aſtringent Medicines to recover the Tone of the Veſſels, as the Practice of the moſt ſucceſsful Phyſicians evidenceth in managing Inflamations of the Eyes, Tonſils, *Uvula*, and in the Roſe, *&c.* tho' relaxing Medicines be found moſt ſucceſsful when applied to the Neighbourhood of the Veſſels affected. Beſides, I muſt notice, that a Fever is not always a concomitant of Inflamations, we finding thoſe of the Eyes, Tonſils, *&c.* frequently without it; which Obſervation is of great Uſe to inveſtigate Pains of the Stomach and Inteſtines when fixed to one Part, for theſe are ſeldom without Inflamation, and may come and go as thoſe of the Eyes do; but nothing is ſo certain a Remedy for them as Blooding, tho' they have no Fever along with them, which ſome have made the only Indication of Blooding in theſe Caſes; nay, I have ſeen Baſtard Pleuriſies with ſtrong Rheumatick Blood continue for ſome Months without the Pulſe being raiſed; for which, the only Relief was Blooding, Bliſtering and Fomentations. One Thing was obſervable in thoſe Patients, that when bled, upon the firſt Attack of the Diſeaſe, which for ſome Time was epidemical, that it left them immediately; but if neglected for eight Days, as was done in ſome, who finding the Stitches ſupportable, put off the Blooding as long as they could, then it turned very obſtinate; by which it is plain that the Veſſels were weakned by the continued Force of the Blood upon them, and ſo, tho' the Revulſion was made, they had not Strength to recover themſelves, and reſtrain the Blood for the future; beſides, it is to be remarked, that all Manner of Drink taken cold raiſed the Pain; which muſt be allowed to have proceeded from the Contraction of the Veſſels near to which it paſſed at firſt, by which the Blood was forced in upon the affected Part; and not from affecting the Part it ſelf with its Coldneſs, ſince of Neceſſity the Drink would turn warm before that was reached; by the ſame Way it is we account for cold Drink affecting the Breaſts of ſome delicate Nurſes ſo very ſenſibly. This Way of accounting for ſuch ſurpriſing Effects is, I am ſuſpicious, too ſimple and obvious to be regarded by thoſe who are taken with nothing but what is myſterious; they ſeem to have trode very little in Nature's Ways; inſtead of diſſecting the real Compoſitions that Nature has provided for the Subject of our Speculations, they firſt fancy Things, and then make Commentaries upon them: But I ſhall not inlarge upon ſuch Reflections, only I muſt take upon me to recommend my Lord *Verulam*'s *Novum Organum Scientiarum* to our preſent Improvers and Students in Medicine, that they may be taught the different Ways by which natural Philoſophers are ſeduced and fall into

Error, and acquire a juſt Notion of the Rules that are ſucceſsfully to be followed in all the Parts of natural Philoſophy. In the mean Time, I ſhall make my Exit in his Lordſhip's Words, which all along I propoſed to conform my ſelf to, however unſucceſsfully. *Non ullam aut vim, aut inſidias hominum judiciis fecimus, aut paramus; verum eos ad res ipſas & rerum fædera adducimus; ut ipſi videant, quid habeant, quid arguant quid addant, atque in commune conferant. Nos autem, ſi qua in re, vel male credidimus, vel obdormibimus, & minus attendimus, vel defecimus in via, & inquiſitionem abrupimus; nihilominus iis modis res nudas & apertas, exhibemus, ut errores noſtri antequam ſcientiæ maſſam altius inficiant notari & ſeparari poſſint.*

FINIS.